THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

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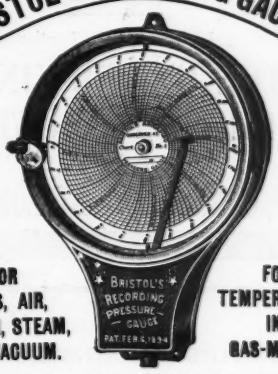

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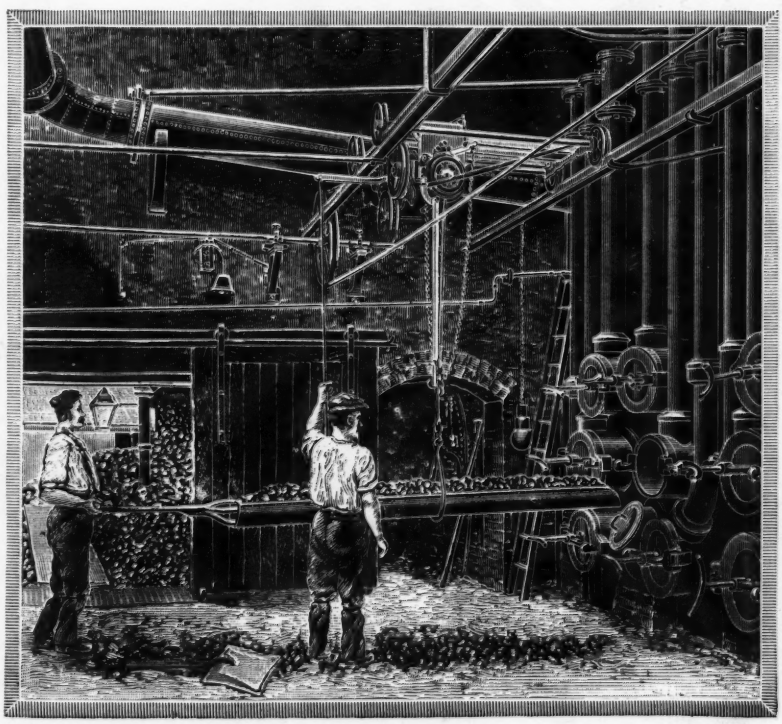

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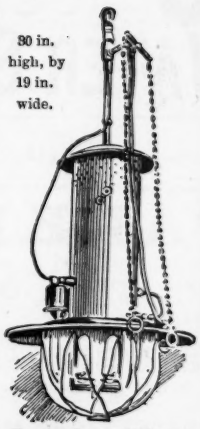

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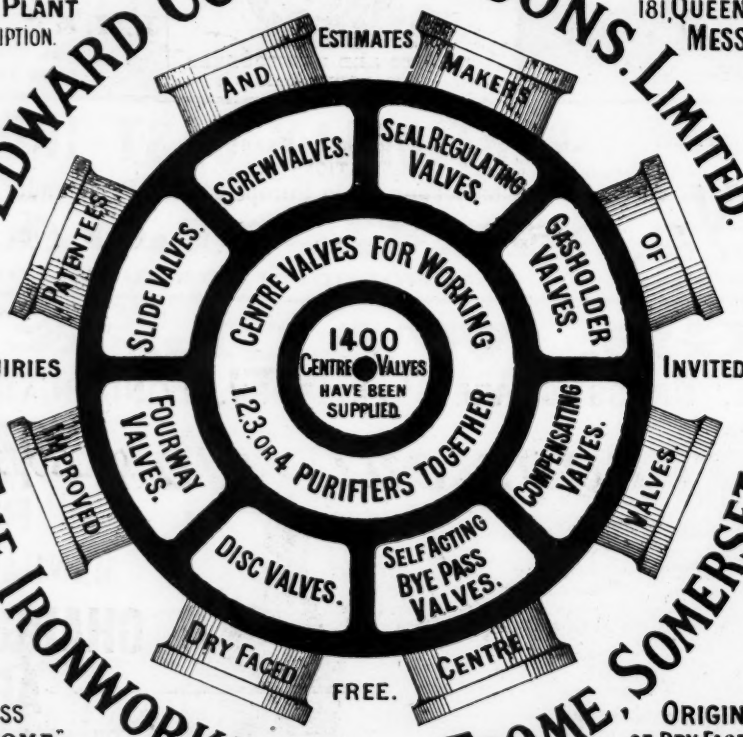

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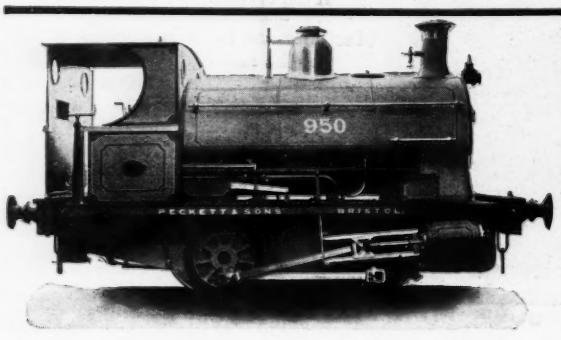

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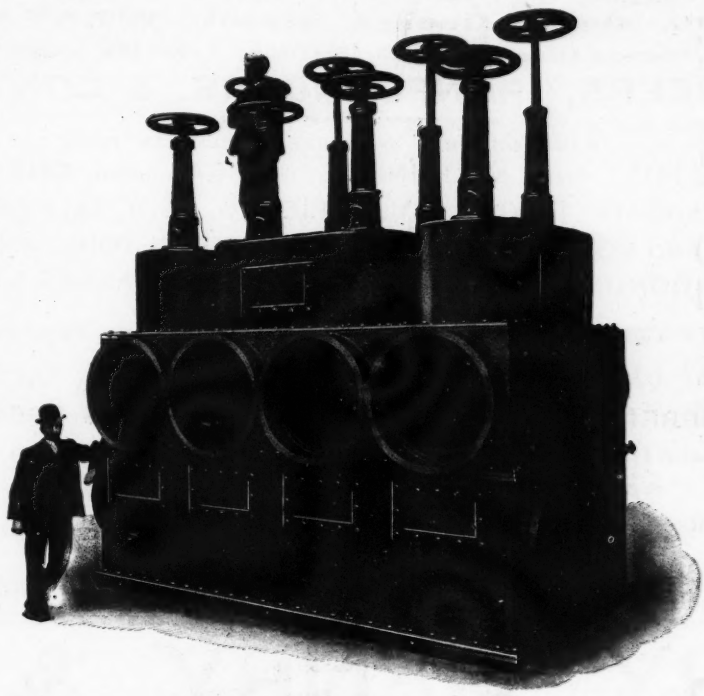

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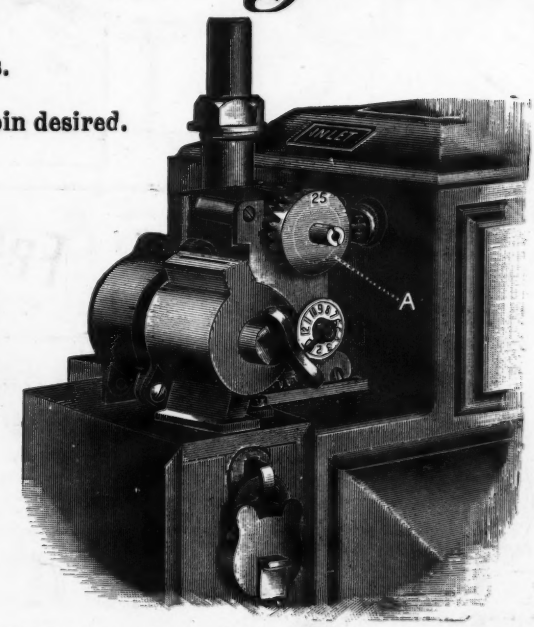

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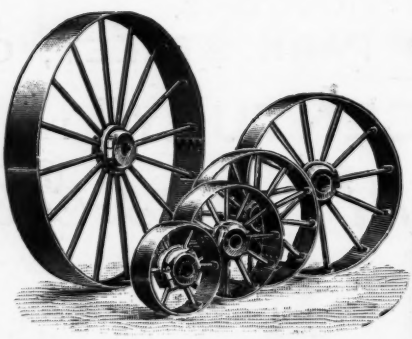

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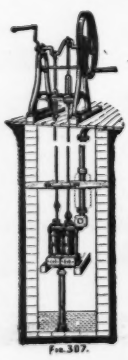
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Fig. 1A. Fig. 89. Fig. 46. Fig. 195. Fig. 550. Fig. 252. Fig. 256. Fig. 69. End 103 Fig. 328.

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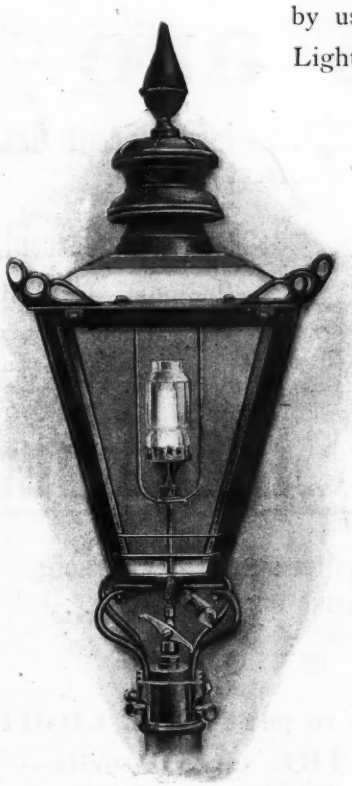

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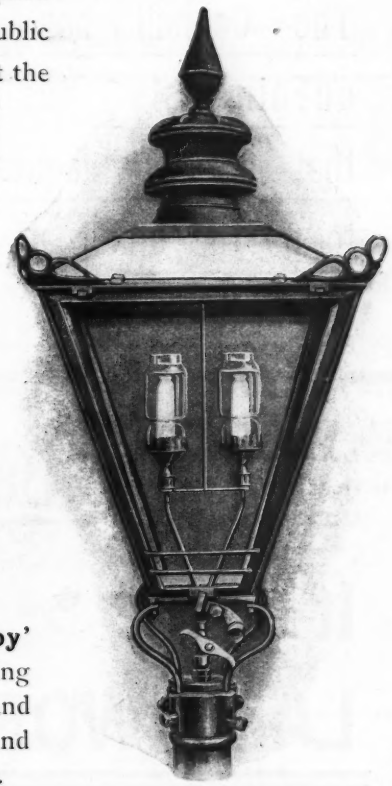

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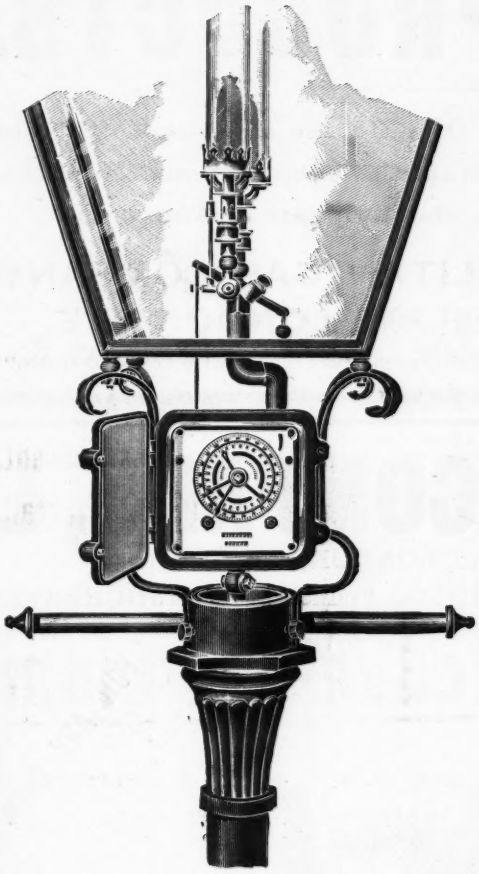

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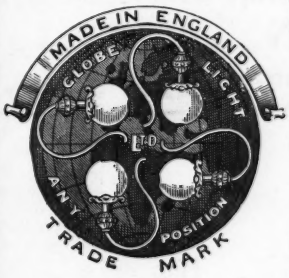

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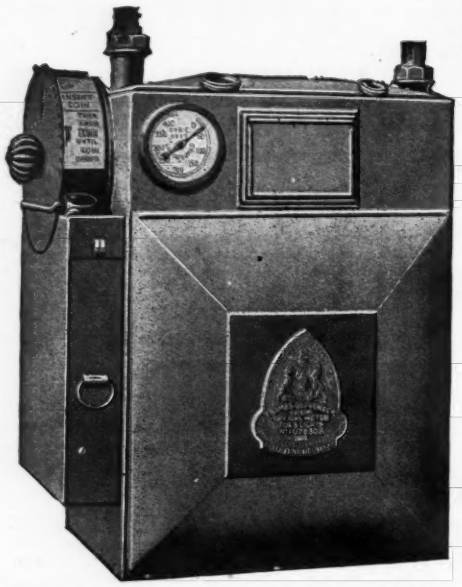

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EDITORIAL NOTES—GAS, &c.

The Gas Acts and their Lessons.

THE time has arrived for the preparation of Bills for the ensuing session of Parliament; and it may therefore be desirable to pass in greater review than has yet been done some of the more salient features of the legislation of the past session. From one point of view, this legislation was comparatively barren of results, inasmuch as it afforded less than the usual amount of occupation for lawyers and experts; but it stands out, nevertheless, as a record of solid work of which both promoters and opponents would do well to take careful note. This is the more necessary because recent experience shows that the fact of a Bill being unopposed no longer implies its safe passage through Parliament in the form desired by its promoters. The Committees of both Houses on Unopposed Bills have now to be reckoned with to a much greater extent than formerly; and there are some matters—notably, the question of discounts to large consumers, and that of the additional price to be charged for gas consumed through prepayment meters—which they seem to have taken under their special care.

One of the most prominent Bills of the session was that promoted by the South Shields Gas Company. This provided for the compulsory acquisition of certain lands adjoining the gas-works for the purpose of securing railway communication. This was strongly opposed in the Commons Committee by the landowners, who were also proprietors of a neighbouring colliery (and consequently had a double interest in the matter), seeing that the object of the promoters was to open up fresh sources of coal supply in competition with them. In the result, the Company—and through them the interests of the consumers—prevailed with the Committee, and a settlement was arrived at between the parties before the second Committee stage was reached. Probably the opposition was encouraged by the well-known reluctance of Parliament to grant compulsory powers for the purchase of land for gas-works purposes, if opposed. But whatever may be felt as to this, there is a clear distinction to be drawn between land—it may be in some new locality—required for the actual manufacture of gas, and that which may be needed in order to give increased facilities for economical production to existing and long established works. The Bill also contained provisions for the abolition of the restrictions as to the presence of sulphur compounds other than sulphuretted hydrogen, and for a reduction of illuminating power from 16 to 14 candles. On both points the Company were successful, but with a reduction of 3d. per 1000 cubic feet in their initial price. The Chairman of the Committee, however, made it clear that the amount of this reduction was not to be regarded as a precedent, because, in fixing it, the Committee had taken into consideration the advantage likely to accrue to the Company from the railway communication above referred to. It is evident, however, that concessions as regards illuminating power and purity are now mainly a question of terms; and even the Board of Trade Committee, whose report has immensely strengthened the case against sulphur restrictions, while unable to place a value on their removal, expressed an opinion that such removal might certainly afford an opportunity for a further revision of the sliding-scale of dividends, with a view to holding out to the Metropolitan Companies greater inducement to economy. That which is good for the Metropolis should also be good for the Provinces; and those Provincial Companies who may be seeking to rid themselves of sulphur restrictions would do well to prepare accordingly.

Those who may still cherish the old idea of a high illuminating power will find but little to comfort them in the action of Parliament as revealed by the legislature under consideration. In several other instances besides that of South Shields reductions of illuminating power to 14 candles were made; and 14 candles may now be regarded as the ruling standard—the Model Gas Bill (which prescribes 15 candles) notwithstanding. This came out very clearly in the discussion upon the gas clauses of the Leeds Corporation Consolidation Bill. "The candle power," said Mr. Boyce, who represented the Local Government Board, "is "reduced to 14 in nearly all Bills now." Straightway the candle power in this Bill was reduced to 14, although the promoters had originally asked only for a reduction from 18 to 16. What have the opponents of low-grade gas to say to this sweeping reduction of 4 candles? Who are likely to be right and who wrong, in this matter? It has already been stated in the "JOURNAL" that this Bill has had to be hung up until next session, owing to insufficiency of time for it to pass the final stages in the House of Lords last session. Although, however, 14 candles has thus become the rule, it need hardly be said that there is no special virtue in the number 14 as thus applied. This was fixed upon originally because of its presumed agreement with the normal yield of Newcastle coal. In like manner, 10,000 cubic feet per ton was looked upon as the normal yield of this coal. But to-day this quantity is greatly exceeded. Both quantity and quality are, in fact, very much a question of carbonizing methods; and the one aim should be to extract out of the available coal the utmost possible sperm, or—to put it more correctly—calorific, value. So long, therefore, as it may continue to be necessary to fix a standard of illuminating power, this should not be fixed so high as to make it a matter of difficulty to maintain it, because this frequently involves a restricted production. The difficulty should rather be the other way—namely, to work down to it, if improvement in carbonizing methods is to be encouraged.

It was greatly hoped, and, indeed, anticipated with some confidence, that the Board of Trade Committee would have been able to determine a mode of testing for illuminating power that could be generally followed, as placing all descriptions of common gas under equal conditions. That anticipation has not been realized; for it is clearly impossible for the gas industry to accept the 5 cubic feet rate of consumption suggested by the Committee as a satisfactory solution of the question. In the uncertainty that exists in the meantime, and must continue to exist until a definite settlement has been arrived at, it is inevitable that there should be diversity in the prescribed methods of testing, and even in the description of burner to be used. In one or two cases, however, it has been provided that the method of testing shall be such as may be prescribed for the Metropolis; and (even though it may seem almost like staking one's all on a single cast) this appears to offer the fairest chance of ultimate uniformity. To all appearances, the question as affecting the Metropolis will be settled during the next session of Parliament; for, although the Board of Trade have made no sign of their intention to promote legislation on the lines of their Committee's report, the London County Council have intimated their intention to promote a Bill, and it is known also that the three Metropolitan Companies are contemplating action. There is, consequently, a very reasonable probability that those who purpose to follow the method prescribed for the Metropolis will not be kept long in suspense as to what that method is to be.

One new feature of recent legislation is the insertion of clauses for the protection of road authorities against liability for damage done to gas-pipes by their steam-rollers. This has taken the form of prescribing the depth at which such pipes shall be laid. Attention was directed to this point in an article on the Gas-Works Clauses Acts in the "JOURNAL" for July 19 last, in which an opinion was expressed that an agreement might be arrived at, and embodied in a General Act, as to the depth at which gas-mains should be laid in macadamized roads, having regard to the now general use of the steam-roller. In the absence of any such general agreement, it is not, perhaps, surprising that, in one case, the specified depth is 2 ft. 6 in. In the other three of the four Acts in which this provision occurs, 2 feet is regarded as adequate; and this agrees with the experience of some of the largest undertakings in the Kingdom—it being found that where the foundation on which the pipes rest is properly consolidated, 2 feet of covering is quite sufficient to

protect the mains from injury from the heaviest of traffic. This, of course, applies only to the cast-iron mains, which alone need protection. Service-pipes, being made of wrought iron, are able to withstand a much heavier strain; and there is not the same necessity to prescribe a depth of covering for them. It is true that in the four Acts referred to service-pipes are included in the provision as to depth; but, with regard to them, it is next to impossible that any prescribed depth can be uniformly adhered to. Allowance has to be made for the necessary fall to the main, the curvature of the road, and other conditions in which variations occur. While, therefore, it is but reasonable to agree to a depth (say) of 2 feet for mains, such agreement ought not to extend to service-pipes, which are sufficiently protected by being made of wrought iron, and have to be laid under conditions over which the gas manager can exercise but little or no control. [Other features of the Acts will be noticed next week.]

Gas Legislation for the Metropolis.

In another column will be found a report of the proceedings of the London County Council at their meeting last Tuesday, in regard to the supply of gas to the Metropolis. It will be seen from this that the Parliamentary Committee of the Council are credited with having been successful in obtaining the appointment by the Board of Trade of the Departmental Committee to consider the whole question of gas testing. This appointment, however, was in reality the Council's resource for relief from the serious difficulty in which they found themselves by promoting legislation on the lines of the interpretation of their duties by the Gas Referees, and was agreed to by the Companies on condition that the inquiry should embrace other matters—notably, the stringent test imposed for sulphuretted hydrogen, and the restrictions as to sulphur compounds other than sulphuretted hydrogen. It will be recollected that the position was created by the absence from the Commercial Company's Act of 1902 of any definition of the mode by which the Company's 14-candle gas was to be tested. This was left for the Gas Referees to determine; it being fully expected that they would adopt the method prescribed by the South Metropolitan Gas Company's Act of 1900. Instead, however, they decided that they had no alternative but to prescribe the 5-foot rate for 14-candle illumination, under the legislation which governs their duties. This necessitated action on the part of the Commercial Gas Company, whose Bill, making it obligatory upon the Gas Referees to prescribe the South Metropolitan Company's mode of testing, was passed, subject to its operation being limited to three years, so as to enable a full inquiry into the question to be made in the meantime.

This investigation has taken place, and the recommendations of the Departmental Committee were made public nearly four months ago. They are in the main satisfactory to the gas industry, inasmuch as it is not proposed to alter the quality of the gas now supplied by the South Metropolitan and Commercial Companies, while it deals what may be fairly described as a death-blow to the restrictions imposed on the Companies in regard to sulphur impurities by pedantry, prejudice, and ignorance. That the Committee were unable to make any pronouncement on the subject of lower illuminating power, unless to the effect that there is something to be said on both sides of the question, is not a matter of very great importance, seeing that Parliament has shown itself to be thoroughly progressive in this regard. It is otherwise with the proposal of the Committee to revert to the 5-foot rate of consumption for testing 14-candle gas; for this can only be described as reactionary, and destructive (if adopted) of the hopes of the industry for the enactment of a method of testing that shall be equally fair for all descriptions of what is generally known as "common" gas.

But it must appear to any reflecting member of the London County Council that the attempts of that body to initiate gas legislation have hitherto been exceedingly barren and unprofitable in results, if not attended with disaster. Take this very question of a 5-foot rate of consumption, the raising of which was the cause of the Board of Trade inquiry. Had the Commercial Company acquiesced in the ruling of the Gas Referees, they would have had to supply, as of 14-candle power, gas of a higher quality by 1 candle than the 14-candle gas of the South Metropolitan Company, although, in Committee on their Bill, their proposals were debated as being identical with those of the latter Company, which had previously received parliamentary sanction. What was the object of the Council in seeking to bring the South Metropolitan Company under the same method of testing? Was it to extort from them, as well as from the Commercial Company, an extra candle? If so, the attempt has utterly failed. No alteration of quality is proposed; and therefore the only effect of the Committee's recommendation in this regard would be to call that which is now rated as 14-candle gas 13-candle gas. Thus, as was remarked in these columns on Aug. 9 last, the substance would remain with the Company and their consumers, while the shadow only is to be the reward of those who foolishly pursue it, if it does not elude their grasp. The Council have the further mortification of knowing that they have—unintentionally it need not be said—advanced the cause of freedom by evoking an authoritative and emphatic condemnation of the sulphur restrictions. Undeterred, however, by their long record of failures—which, unfortunately, has not affected their pockets individually—they have now decided, as our report shows, to promote a Bill in the ensuing session to bring the Companies into line with the recommendations of the Board of Trade Committee, excepting that which relates to the removal of restrictions in regard to sulphur compounds, from which they express their dissent. It is proposed also to deal with some additional points, so that the Bill, when it makes its appearance, may be regarded as an endeavour on the part of the County Council to show that their capacity for constructive gas legislation has hitherto been belied. They are so much given to act "on their "own" in these matters, that it is perhaps too much to say that their proposed action has been influenced by the knowledge that the Board of Trade do not themselves intend to promote a Bill for the purpose of carrying out the recommendations of their Committee.

What will be the attitude of the Companies towards this question, is not in any doubt whatever. They will firmly and strenuously, but not unreasonably, oppose the meddlesomeness of the Council, and will, either severally or jointly, apply for parliamentary enactment of the relief which the recommendations of the Board of Trade Committee hold in prospect. This is but their due, after so many years of unavailing remonstrance. It is greatly to be hoped that they will find themselves able to take joint action; for they need not to be reminded that in these matters, as in others, "Union is strength." There can be but few differences between them in connection with the subject; and these should not be difficult to adjust. It is an open secret that within the last few days a meeting of the three Companies has been held, with the idea of arriving at a common ground of action. On one debateable point—namely, the mode of testing—they may be assured of the sympathy and support of the entire gas industry. It will be recollected that at the annual meeting of the Institution of Gas Engineers last June, a resolution was unanimously passed protesting against the proposal to revert to the 5-foot rate of consumption. We are informed that the subject came up for discussion at a meeting of the Council of the Institution last week; and a Committee was appointed to consider and draw up a representation on the subject for presentation to the Board of Trade. This should be of great service to the Metropolitan Companies at the present juncture, and can hardly fail to have weight with the Board of Trade.

The Management of Councillors and of Municipal Gas Undertakings.

There is a great distinction between the management of a private gas undertaking and one that is municipally owned. In the case of the former, so long as dividends are maintained, or are upwardly bound through the decrease in the price of gas to consumers, the policy and general management of the directors are not questioned, and the officials are rarely harassed by importunate and trifling inquirers. But this comparatively peaceful condition of things can never be so thoroughly emulated in the case of large municipalities, where counsels and policy are rent and detrimentally affected by factions. No matter how good the policy adopted by a committee, who are—through an intimate acquaintance with the position, supported also by the advice of those professionally qualified to counsel—the best judges of the work, that policy has to be submitted to the arbitrary judgment of a

less responsible and qualified Council than the departmental executive concerned. This is a state of things that cannot be completely altered under the present—tyrannical to an extent—conditions of local government. But it is one that can be bettered by the executive doing more to infuse among their fellow councillors a better knowledge of the inner working of the undertaking of which they (the executive) have charge. One way is to invite them to occasional inspections of the works, where many object-lessons can be judiciously offered for their consideration, and so make known to them more of the technical methods, difficulties, influences, and requirements that are at one end of the stick which has finance only at the other. Appreciation of the fact that the stick is weighted at both ends will not allow it to be handled with such facility for beating a Committee as is now often the case.

Inspections of gas-works by the owning municipal bodies are not unknown; but they are all too uncommon. In the case of Manchester, there has not been one for eleven years; and many have been the repeated changes in the *personnel* of that body during the time that has passed. We venture, therefore, to think that the special inspection of the works, and the entertainment to which the Chairman (Mr. Alderman Gibson) and the members of the Gas Committee invited their colleagues in the civic government last Thursday—at which an opportunity was given for an informal but straight talk on the subject of the affairs of the department—have done more to knit tighter sympathy and friendship for the Committee in their responsible labours than many discussions in the Council Chamber could possibly have done. In the remarks made at the dinner by Mr. Charles Nickson, the Superintendent of the Department (who is as keen and alert as ever in its interests), he appealed for equitable treatment in criticism for the officials; claiming that they should not be charged with a policy over which they have no control, but that they should be estimated as to the efficiency, integrity, and honour with which they carry out that policy. No one can honestly turn a deaf ear to that claim; but it is one that is all too frequently neglected by critics. It is a point that can be considered altogether apart from the propriety of local authorities indulging in municipal trading; and the consideration claimed by Mr. Nickson for himself and his colleagues can be likewise asked for many Committees—the Manchester Gas Committee among the number. There is a proneness to tar committees and officials with the same brush as the whole body who have the final word, and who, in passing that final word, often tighten the fetters that deter a committee from carrying out a line of policy which they have taken considerable trouble to mould, generally in collaboration with their officials.

Take, as an example, the price of gas in Manchester. It is now within the city, for ordinary use, 2s. 4d. per 1000 cubic feet, and meter-rents and stove-rents are not charged. Some time since, Alderman Gibson (whose history as a gas administrator has been permeated with a soundness of policy with which the most progressive gas company administrators could not find fault) made strenuous effort to get the department relieved from the burden of a large contribution to the rates, in order that the consumers—having maintained the undertaking and met all the capital charges—might profit by the lowering of the price of gas, and the undertaking itself by the increased business that comes from the sale of a cheaper commodity. But the Council were dead-set against the proposal, which was almost ignominiously thrown overboard. The property owners were too strong for the Committee; and so last year the gas consumers beat the record at "relieving the rates" by being compelled to contribute the heavy sum of £70,000. The counter policy to their own was one over which the Committee "had no control;" and so the load of £70,000 must not, in criticizing Manchester, be accounted to their discredit. On Thursday, Mr. J. G. Newbigging "nailed his colours to the "mast" as a cheap-gas man when he said he considered that nothing should stand in the way of gas being sold in Manchester at 2s. per 1000 cubic feet. Nor is there even now anything to prevent a near approach to that 2s., except the absurdly heavy contribution to the rates. After paying capital charges for the last financial year, the department had a balance of net profit equal to 4·52d. per 1000 cubic feet; and gas is now sold in Manchester for ordinary purposes at 2s. 4d. True it was after the financial year closed that the price of gas was reduced by 2d.; but even then there is a respectable balance left of that 4·52d., besides the increasing business, with which to at once get closer to Mr. Newbigging's ideal of 2s. And 2s. for 17·80-candle gas tested by —be it noted—a flat-flame burner, and no meter-rents or stove-hire, would be a result of good policy of which Manchester might be proud. Speaking of meter and stove rents, it is questionable whether appreciation and effect of their remission is so perennial as a corresponding reduction of the price of the commodity. A low charge for an article is a constant incentive to its free and widespread use. The price of the article is the thing that is compared to ascertain its relative cheapness; while the advantage of the removal of the rents for meter and stove is soon forgotten, and consequently overlooked in the comparison.

However, the inspection on Thursday was a genuine success; and if it stimulates a keener desire in the breasts of the members of the Council to see their magnificent gas undertaking second to none among wisely administered municipal concerns, the result would be one of the hardest knocks that they could possibly administer in the cause of municipal trading. The blemish at present is the large amount appropriated in aid of the rates; the effect of the removal of that blemish would travel far beyond Manchester. One word more. We are glad to see that the attack that has been made locally on the administration of the department, and the offensive publication of the names of the several officials, with their salaries attached (this was referred to in the "JOURNAL" a fortnight since) are being roundly condemned by the city councillors. To ostracize from public life the perpetrator of such an outrage on the staff would only be what he richly deserves.

Municipal Trading in Edinburgh.

As will be seen by the report which appears in another column, municipal trading formed the theme of discussion between the Edinburgh and Leith Gas Commissioners and a section of traders on Monday last week. It was indeed a very sectional presentation of the question that was made; the interests involved scarcely reaching to that of the general community, but lying almost exclusively in the region of the bread-and-butter of a particular class. This makes the consideration of what transpired at the conference of less consequence generally; and we may therefore leave altogether out of account the question of the abstract advantages or disadvantages of municipal trading—merely observing, in passing, that a day or two later, at the opening of the new gas-works at North Berwick, such a profound economist as Mr. R. B. Haldane, K.C., M.P., seemed to give support to one of the views of the traders, in the remark that municipal trading was open to criticism when the rates were employed to enter into competition with private individuals. The questions discussed were the more parochial ones of whether discount should be allowed to traders, whether the Gas Commissioners were cutting prices, and whether their system of working was not more wasteful than that of private traders. The word "discount" is scarcely the proper one to use here. What the traders aim at is the getting of commission for bringing business. That is quite a usual form of transaction, and would pay the traders; but the Gas Commissioners are face to face with this difficulty: If they are to give discount, they would require to dip more largely into the gas revenue than they have done (their doing this, by the way, is one of the things which the traders object to); and that, therefore, any discount they might pay would have to be thrown upon the purchasers or hirers of gas appliances. The questions arise of how the public would appreciate an arrangement with the traders which would have the effect of increasing the charges made upon them, and how far would operate the temptation to traders not to keep any stock on their own premises, but to turn customers over to the Gas Commissioners, and then claim their allowance. These are points of difficulty which will require some consideration in the clearing up.

The traders say the Commissioners, having the revenue from gas to dip into, cut prices to an extent which precludes competition; but they also say they do work more economically than the Commissioners—thus making two statements which cross each other. On which of the two do they rely? The cutting they complain of is the selling at so much below list prices. Is it, then, the list price that is the cause of all the mischief? It would seem to be so, because the public see the list prices, and can compare what they are charged by the one and the other—and, of course, calculate their relative

profits. It would thus seem as if the deputations should have gone, in the first instance at least, to the manufacturers, and induced them to fix their list prices so that no one could afford to sell below them. In truth, this would be as good a solution of the difficulty as could be imagined. How far it would suit the traders is quite another matter, for a lowering of list prices would have the effect of reducing profits, and this is not what they desire. The wish is that the Gas Commissioners should make larger profits, which is an entirely gratuitous suggestion upon their part, seeing that the Commissioners do not, to any appreciable extent, lose upon their sales. It is the cost of fitting up which they write down.

The position is that the traders desire, it would seem, not that gas appliances should be cheapened to allow of their use becoming universal, but that they should be kept at a high price for their benefit. This is purely a bread-and-butter question, and only in this respect is it worthy of consideration. But so also is the bread-and-butter of the Gas Commissioners, if not of the community. The Commissioners will doubtless take some such considerations as these into account in arriving at a decision in the matter. The question of economical working may be dismissed in a sentence. Some workmen are careless, and are wasteful of material; but an isolated instance of this does not prove anything. The economy meant is, of course, economy to the public; and no one will question which is the more economical for them—the employment of the Commissioners, whose employees come, do their work, and depart, having no interest to do otherwise, or the employment of a private trader, whose employees, when once they get into the premises, cannot be got out until a big bill has been run up. On the merits of the questions they raised, the traders of Edinburgh and Leith have made a poor show indeed.

The Birmingham Explosion.

THE full effects of the calamitous explosion at the Saltley Gas-Works of the Birmingham Corporation are, it is to be hoped, now known. The disaster has claimed three victims —all comparatively young men; and two other men are still lying in the hospital, but all around them are hopeful of a speedy mending of their injuries. The loss of life and the mental suffering of the bereaved are the most painful aspects of the disaster; the damage to property is extensive, but not irreparable, though it involves many thousands of pounds. Public sympathy with the dependants and other relatives of those who were so suddenly hurled from life into death has been widespread. But, fortunately, the sorrow of those dependants will not be heightened by destitution, as it is unnecessary to say that the City Council will look after their future needs. The greater part of the heavy damage to the gas-works is covered by insurance; and as to the injured surrounding property, the Gas Department immediately and wisely recognized their liability, and invited householders and property owners to at once send in particulars of the damage they had sustained. The disaster, of course, plunged the officials of the Gas Department into a period of tense anxiety—particularly the Chief Engineer (Mr. Henry Hack)—and with them there will be the greatest sympathy throughout the industry.

It is a matter for congratulation that such terrible occurrences in gas-works as this are so infrequent; but each one has its lessons and warnings. In this case, the wrecking of the purifier-house and the loss of three of the men who went into it before the explosion occurred, may hide for ever links in the concatenation of circumstances that had such lamentable consequences. The inquest on the victims was opened on Friday. But the inquiry cannot yet be completed; and therefore it is better there should be no discussion of mere hypotheses. Further investigation may throw additional light on the matter. We hope it will. Certain facts, however, were clearly brought out at the opening of the inquest, which facts seem to indicate that negligence had no part in the cause of the explosion, but that it was purely accidental. Nothing has been detected to show that any part of the plant was out of order before the explosion; all the taps of the enclosed lamps in the house were found turned off; just before the explosion "the pressure in the purifiers rose sud-"denly and heavily;" Jordan—the first victim—discovered that the seal of one of the purifiers had blown; he and other men whom he summoned to his aid acted with a promptitude worthy of the most loyal of servants; and the safety lamp which Jordan carried into the house was stated to have been in perfect order the day preceding the disaster. These are the conspicuously clear facts disclosed by the evidence so far adduced. Was the lamp damaged in the excitement of easing the pressure in the purifiers? This, perhaps, is a question that will never be satisfactorily answered.

The Decline of the Strike.

Attention was drawn last week to the highly significant manner in which several recent strikes have terminated—that is, by the decision of the unfortunate men involved to throw over the Union that had been the cause of their trouble, and to assert the right to freedom of action which, had they been wise, they would never have relinquished. The seriousness of the development from the Trade Union point of view can hardly be exaggerated; for, if it grows, it will soon threaten the very existence of these organizations. Naturally, therefore, considerable attention is being given to the subject by those who hold that the interests of both masters and men are injuriously affected by the existing condition of things. An industrial correspondent of the "Pall Mall Gazette" draws attention to what he regards as a very general tendency throughout the country to discredit Trade Union organizations, and more especially, perhaps, the officials. The numbers connected with the Unions, he points out, are yet, no doubt, enormous; but it is becoming increasingly evident that a large proportion of those who pay their weekly and monthly levies are now merely nominal supporters of a system which, in a variety of ways, is doing the workman more harm than good. Especially is it coming to be seen that the strikes into which the officials so often light-heartedly plunge their members do not pay; and there are thousands of people in Lancashire to-day—apart from the Ashton cotton-mill strike—who bitterly regret having listened to those who pull the strings of labour from the operatives' side. This is only one aspect of the question; there are, of course, others. For instance, there is the restriction of output, which the correspondent of our contemporary points out prevents the masters from getting the value out of their machinery, and stifles the spirit of enterprise among the men. The result is that some of our best mechanics and engineers are being attracted to America, where they are able to make the most of their powers and to receive reward accordingly.

Experience in America.

In the United States also it would seem that the policy of strike is losing some of its attractiveness as a means of extorting concessions from employers. According to the Chicago correspondent of the "Financial Times," the labour situation has greatly improved from what it has been during the last two or three years; the peculiar feature at present being that strikes are uniformly and wholly unsuccessful, whereas a twelvemonth ago they seldom resulted in a complete defeat for the Labour Unions, and in many instances the employers were forced to concede practically everything that was asked. The lack of success which now attends strikes is causing labour to be more conservative and more reasonable; and this in turn makes the industrial outlook more peaceful than it has been for some time past. One cause, at any rate, of this altered state of things may be that the present supply of labour, especially unskilled, in nearly every industry is greater than the demand, which was not the case some years ago. But by whatever means the change has been brought about, it is to be welcomed. The workmen have, as usual, bought their experience in a particularly expensive manner; but they are from this fact all the more likely to value it. So salutary has been the lesson, that even "labour leaders" themselves have been compelled to admit that their previous arrogant attitude towards employers was a mistake, and did the workers very much more harm than it did their employers! But this repentance, as is so often the case, comes very late; for immediately on the defeat of the strike in the packing industry (after great suffering on the part of the men), there was a general movement among employers of labour in Chicago to subvert the tyranny of the Unions. The result is that at least two of the very large works are now operating on the "open shop" basis—that is, Unionists and non-Unionists are employed without discrimination—while in

one case the men have to work an hour a day longer for the same remuneration as before, and in the other there has been a reduction of from 10 to 20 per cent. in wages. Thus the strike seems to be as sadly discredited in America as in this country. May it evermore remain so. How many hundreds of thousands of men, helpless women, and poor little children must wish that such a barbarous method of settling disputes had been in the past less frequently resorted to.

The Cause of Free Labour.

We must confess that our consideration of this fresh phase of the labour question has been confined to the interests of the employers and employed; but there is, of course, another class whose welfare is at stake—namely, the "labour leaders." The pitiable condition to which these worthies may find themselves reduced is set forth in the twelfth annual report of the National Free Labour Association, which plaintively asks: "Can it be that we are gradually approaching the time when the labour agitator will be reduced to the ranks of the unemployed, or have to get a living otherwise than by the sweat of his jaw?" Should this happily come to pass, the Association mentioned will certainly be able to lay claim to having done something towards bringing it about. As the name implies, this body are engaged in combating Trade Union tyranny, and upholding the right of men to work, and employers to employ, without dictation or interference. Some idea of the work accomplished will be gathered from the fact that the registers of the chief and district offices show that during the past twelve months over 21,000 mechanics registered their names for employment, and of these 7500 were sent to situations with subscribing employers, embracing over twenty different trades and industries. Every workman so supplied is required to produce references as to his qualification and good character; and no one is sent out without an official "approval card" properly signed, stamped, and dated. The Association keep in constant touch with the men sent out, so as to enable them to deal promptly with cases of Trade Union aggression and interference. Members are instructed to work quietly and unobtrusively, interfering with no one, nor tolerating interference by others, and guided only by the instructions of their employers or those in authority. Any agitation or interference inside the workshop is to be at once reported to the General Secretary, who immediately communicates the fact to the employer concerned, leaving him to take what steps he likes in the matter. This system of detecting and reporting "shop lawyers" has, it is remarked, been found very efficacious—an ounce of prevention being better than a ton of cure. In spite of the recent decline in the number of strikes and lock-outs (which, after all, may be only a temporary improvement), it is impossible for any employer of labour to be certain that he will not suddenly be confronted with a serious dispute of some kind or another. It is, therefore, well to emphasize the fact that an organization like the Free Labour Association exists for the purpose of assisting them under such circumstances. In addition to this, a still more extended use of the registers is invited for the constant and ordinary supply of non-Union workmen. The quality of the labour sent out is said to be ensured by systematic investigation and inquiry, so that the Association should constitute a valuable employment bureau, altogether apart from the extensive fighting powers which it has so frequently exercised with good effect.

Royal Commissions and their Cost.

The new arrival at St. Stephen's who, fired with zeal for reform, rises in his place and with a light heart moves for returns on this, that, or the other subject which may be of interest to a handful of his constituents and to no one else, in all probability does not appreciate the trouble and expense that will be incurred should his request unfortunately be granted. We say "unfortunately," because the time of the officials of the particular department concerned is occupied in the compilation of statistics filling bulky Blue-Books, a large number of which may possibly find their way to the waste-paper dealers. But if the clamourer for returns causes heavy expenditure of the national funds, what shall be said of him who is continually demanding the appointment of Royal Commissions? He is a cause of very heavy expenditure, to judge by the figures presented in a return issued last week. From it we learn that no fewer than 26 Royal Commissions have been constituted since 1896; and their total cost, up to the date of the return, is given as £272,627, or rather more than a quarter of a million of money. The St. Louis Exhibition figures for £80,149; and that held in Paris in 1900 for £62,033. The Commission on Sewage Disposal is down for £27,322; while the inquiry into the coal supplies was carried through for £13,222. The investigation of the subject of local taxation caused an outlay of £7234; but trade disputes cost only £646. Probably the London Water Supply has been as much the subject of investigation by Royal Commissions as any other. The first was appointed, on the motion of Sir Francis Burdett, in 1828; then came the Chemical Commission in 1851, the Duke of Richmond's in 1869, the Balfour in 1893, and the Llandaff in 1897. The last is, of course, the only one figuring in the return, and it cost £3299. However, the Commission did a great deal of work, the results of which are recorded in two reports, two volumes of evidence, a volume of maps, plans, &c., and indexes to the reports and evidence; and as their investigation helped to the solution of a long-standing difficulty, it would be unbecoming to carp at the cost. At the same time, as already remarked, a Royal Commission is an expensive luxury which should not be too freely indulged in.

To Combat the Metre.

With the object of combating the metre, and defending, standardizing, and simplifying British weights and measures, an Association has been formed, with an Executive Committee which includes some names well known in the industrial world. The title of the organization is the British Weights and Measures Association; and active operations have been commenced by the issue of a manifesto outlining the position taken up. A copy of this is before us; and we would commend it to all who are desirous to study the somewhat vexed question with which it deals. It is a matter in which everybody is more or less interested, inasmuch as the first cost and inconvenience of a total change to the metric system would doubtless be such as to necessitate clear proof that substantial advantages would be gained by the alteration. The Association are particularly anxious that it should be distinctly understood that they have no desire to fight against the use of decimals, which form a common and convenient method of calculating; but they object to being tied solely to them. What they most strongly oppose is the abolition of our well-tried and extremely convenient English units, and the substitution therefor of the units based on the metre. We have not space at disposal to deal at any length with the arguments adduced in the manifesto; but a brief indication may be given of the line of objection taken. In the first place, it is contended that navigators cannot use the metric system; and it is said to be unsuitable as a textile standard. It is also pointed out that the English shipping measurements of draught, displacement, and tonnage are universal; and that measurements of the character of the foot, inch, pound, ounce, and pint are in general use in all countries, the alleged acceptance by those countries of the metric system notwithstanding. The metre itself, it is urged, is too long even for large engineering work, and the decimetre too short, while the millimetre is too long for fine work; but the foot, the inch, and the mill are ideal dimensions, and from one end of the world to the other are identical in length among the English-speaking race. Coming to the all-important question of cost, the Association calculate that, at a low estimate, the expense of the change to British engineers would be £100,000,000; while an American says that £200,000,000 would not repay United States manufacturers the cost of the alteration. There are many other arguments advanced, all of which will doubtless receive due consideration at the hands of both parties to the question—outside the "JOURNAL" columns. Our only desire is to call the attention of readers to the fact that a vigorous Association has been formed for the purpose of defending the existing British weights and measures system.

Sir George Livesey.—The cheerful intelligence was received yesterday afternoon that the surgeon is quite satisfied with the progress that is being made by Sir George—in fact, it is added, "he could not be doing better." Over this good news, many, in addition to ourselves, will rejoice.

NAPHTHALENE REMOVAL.

We welcome another substantial contribution this week to the correspondence on the subject of naphthalene. One writer privately asks us why the "JOURNAL" is devoting "so much space to a naphthalene process which is not new, and has only been on trial three months." It seems to us that it is our various correspondents who are occupying more space than has been editorially taken up in introducing what Mr. Colson believes to be his new discovery of a solvent. But we are pleased to give—so long as correspondents continue to touch upon and circle round the special points involved—any amount of space to a subject that claims, through its difficulties and uncertainties, such a large amount of the time of the gas manager. Regarding the correspondence so far, it is clear that it will do something towards assisting in concentrating attention on one common point; and that is the advantage to be derived from the oil-washing of gas for the removal of naphthalene.

We are afraid that Mr. Bell has been looking through tinted and magnifying glasses when he refers to the "roseate account" of "Mr. Colson's discovery," which is "now whittled down," &c. There has been no whittling down. From the first, it has been abundantly clear to those who read with care precisely how far Mr. Colson claimed that he had arrived at something new to apply to an old system of treating gas; and it is rather astonishing that gas engineers should have tripped up over such a point as that. With regard to one or two matters raised by Mr. Bell, perhaps they can be at once disposed of from personal knowledge. He refers to the quantity of solvent used at Leicester. It must be remembered that at Leicester the working is still (as it were) in an experimental stage; and in its details it has not yet been reduced to scientific limits. It may be that ultimately the quantity of solvent will be reduced to even as low as a quarter of that at present employed. In reference to the point as to the carburetted water-gas plant at Leicester, it is only used as a stand-by; and during the period to which Mr. Colson's figures showing his experiences applied, no carburetted water gas was made. Moreover, his troubles were not lessened when the plant was previously in use.

Now we have a further piece of news. The Colson solvent has not "solved" the difficulty at Sheffield, though it has right up to date at Leicester; and it is Mr. Colson himself who communicates the fact as to Sheffield in the letter below. Under the circumstances, it is with a feeling of something akin to thankfulness that it is remembered that it was written in the "JOURNAL" on Oct. 4: "We will not commit ourselves at present to the definite statement that here is the ultimate and universal cure." But, on the other hand, naphtha washing was not successful at Leicester; we are told that it has been at Derby, Sheffield, Bury, Leamington, Long Eaton, and Harrogate. Again, it happens to be within our knowledge that, after upwards of twelve months' almost continuous working, another well-known process has been found to give such unsatisfactory and discouraging results at a certain works that it has been decided to abandon it, and seek relief in other methods, which, it is hoped, will be more adapted to the apparently exceptional circumstances. Mr. Colson also enters into a statement to show where his solvent differs from the heavy naphtha used at Derby. An interesting point is where he makes it plain that the Leicester solvent is taken from those tar distillates where naphthalene is most abundant. In other words, he uses that portion of oil which, from its high naphthalene content, shows it has the greatest affinity for naphthalene.

Another matter of interest for all is that, directly, no one will know where he is in this matter. Mr. Bell claims that Mr. Colson has copied him; and Mr. Thomas Glover quotes from the Young and Glover specification to show that the Leicester system comes within its four corners. And now Mr. Bell had better mark this passage in Mr. Glover's letter: "It is possible the Derby process is also a child of ours. It certainly has a family resemblance." An interesting contribution to the discussion is also made by Mr. Harold E. Copp.

SIR,—Mr. Bell in your last issue states that the solvent used here for dealing with naphthalene is practically the same as that used at Derby. Mr. Bell is under an entire misapprehension. Having derived no advantage from the use of heavy naphtha made at our own works, Mr. Bell was good enough to give me the name of the firm who had been supplying him; and from this firm I obtained all the naphtha used during a trial of naphtha washing. The firm referred to, writing me on Jan. 25 last, state: "The heavy naphtha as supplied by us to the Derby Gas Company has a specific gravity of 910 to 920, and yields about 90 per cent. at 190°C." The naphtha received from them complied with this test, and corresponded very nearly to the heavy naphtha produced at our own works.

The solvent I am using has no connection whatever with this product, but belongs to a different series of tar distillates. Many times when thinking over the naphthalene difficulty, and the varying production of naphthalene at our tar-works, it has occurred to me that, from the oil where the naphthalene was most prolific, might be learnt something that would be useful in dealing with the question of naphthalene in gas manufacture. This has been the subject of many conversations between Mr. Blake (my Assistant at the chemical works) and myself, and I arranged with him that we would experiment in this direction with a Livesey washer. This was to have been done last year; but owing to the difficulty of setting aside a special still, through repairs, it had to be delayed to this year. This was the origin of the solvent we are now using, and was not suggested by Mr. Bell's naphtha washing, or anything but our own experience and experimental work here. The solvent is beyond the benzol series from which heavy naphtha is obtained, and is taken from those tar distillates where naphthalene is most abundant. I specially state in my patent specification that the naphthas are eliminated.

The following figures will at once show the difference between the two products:—

Heavy Naphtha as used at Derby.

Sp. gr. 910 to 920.

Distilling at 190°C.	90	per cent.
,, 200°C.	8	,,
Residue	2	,,

Solvent used at Leicester.

Sp. gr. 995 to 998.

Distilling at 190°C.	45	per cent.
,, 200°C.	32	,,
,, 216°C.	20	,,
Residue	3	,,

In comparing these figures, the great difference in the specific gravity would be noticed. Then at 190°C. no less than 90 per cent. of the heavy naphtha is over, as against 45 per cent. of the solvent. Further, 190° to 200° in the case of the naphtha 8 per cent. only is obtained, as against in the other 32 per cent. From the solvent, a further 20 per cent. is obtained from 200° to 216°.

With these figures before him, I am sure Mr. Bell will admit that the two things are not one and the same. They are totally different. The naphtha is on the market every day; but, as regards the solvent, I question whether it has ever been made before. But I firmly believe it is going to play an important part in connection with the naphthalene problem, although there is something more to learn yet concerning it. Its success in Leicester is well known; at Sheffield it has not succeeded. For some time it was in operation at the Grimesthorpe works in that town, and in spite of the good wishes of all, from the Chairman downwards, it has not been successful any more than naphtha washing has been with us. This will be a surprise to Mr. Glover.

As regards this latter gentleman's letter, he is evidently under the impression that I am claiming the principle of washing the gas with oil; whereas my specification distinctly disclaims this, and only claims the particular solvent prepared as stated therein.

I may add that I have always considered Mr. Bell's method of dealing with naphthalene a dual one—the washing of hot gas with hot tar and afterwards with heavy naphtha; the first being the essential part. When I found I could rid myself of naphthalene by one operation, the treating of the gas by a liquid new to me, and obtained in a way I have never seen suggested, I thought, and still think, the method a novel one; and those with whom I have conferred upon the subject have been, without exception, entirely at one with me.

Leicester, Oct. 14, 1904. ALFRED COLSON.

SIR,—In your remarks on the correspondence arising out of the introduction of oil-washing for naphthalene removal at Leicester, I notice you inadvertently place limitations to the Young and Glover process which may lead to misunderstanding unless they are promptly corrected.

In making a brief comparison of washing agents employed, you state that "Young and Glover employ heavy tar oils;" and it might be inferred from this sentence that our recommendations and practice had been confined to the use of "heavy" oils. Such an inference would be entirely wrong. Our patent specification distinctly states that "any liquid hydrocarbon that has a large solvent power for naphthalene vapour may be employed, such as the distillates of ordinary coal or oil gas tars or the distillates of the tars recovered from blast-furnace gases, or other cheap hydrocarbon liquids."

Mr. S. Glover has for some years been washing with low-temperature tars and with light oils derived from the tar distillery at his works. In his case, a remedy for naphthalene stoppages was most urgently needed; and it was on his initiative that the original investigation was made as to the nature and cause of naphthalene deposits. After the papers that have been given and the broad and rational lines on which the various processes recommended by us were based, it is too much like quibbling to try to limit the boiling points of the washing agents to be used to a few degrees Centigrade.

"Lest we forget," may I also say that in a joint paper contributed by Mr. Young and myself to the Southern District Association of Gas Engineers on Nov. 6, 1902, we pointed out the possibility of removing naphthalene from the gas by washing the hot gas with cold selected tar. The reasons given and the suggestions made in this paper were well received and widely discussed. Is it possible that the Derby process is also a child of ours? It certainly has a family resemblance.

The discussion in last week's "JOURNAL" has a gratifying side, inasmuch as it gives evidence of a spread of "settled convictions;" and it is not too much to hope that at least Mr. Young's genius

and self-denying work in this department of research may not be overlooked by those who are now being converted from their painful attitude of philosophic doubt.

Norwich, Oct. 15, 1904. THOMAS GLOVER.

SIR,—It will be satisfactory to those who are using washing processes for the elimination of naphthalene from their crude gas to know that Mr. Colson's discovery (of which you gave such a roseate account) is now whittled down to (*a*) an improved solvent prepared from tar and (*b*) washing the whole or part of the crude gases in a Livesey washer after extraction of ammonia. The latter claim hardly requires serious consideration; and I venture to state that if any such claim had been made by a lesser luminary than Mr. Colson, the "JOURNAL" would have ridiculed the whole business.

Now as regards the improved solvent—which appears to consist simply of the fraction obtained from coal tar coming over between 150° and 215° C.—it is probable the claimed improvement will be found, upon further investigation, to be a retrogression, as it appears that Mr. Colson uses about double the quantity of solvent we find necessary.

However, fortunately, the Sheffield Gas Company and their Engineers have been progressive enough to try nearly all the naphthalene processes brought out. They have at the present time the Derby process at their Neepsend works, and the Leicester process at their Grimesthorpe and Effingham Street works. Perhaps their Engineer, Mr. Morrison, who has been investigating this question for a considerable time, will give the results.

There is one factor which up to now has been completely ignored by the "JOURNAL" when writing about the Leicester process—that is, at their Aylestone Road works they have a 2 million cubic feet per day carburetted water-gas plant; and one of the most important claims put forth by makers of carburetted water-gas plants is the relief from naphthalene troubles afforded by its use. There is no doubt that in some places it has given considerable relief; but it, of course, depends upon how the oil is cracked and the quantity of carburetted water gas used.

I now leave the controversial part of the question, and (as promised last week) give your readers the results of our working with the Derby process for the past twelve months upon the whole of the gas made.

NAPHTHALENE COMPLAINTS FOR EACH MONTH.

Derby Process in Operation.

	Total.	Average per Day.		Total.	Average per Day.
1901—			1903—		
September	1658	55·3	September	225	7·5
October	1677	54·1	October	66	2·1
November	1343	44 8	November	57	1·9
December	660	21·3	December	59	1·9
1902—			1904—		
January	248	8·0	January	14	0·4
February	241	8 6	February	2	0·0
March	67	2·2	March	12	0·3
April	24	0 8	April	22	0·7
May	131	4·2	May	51	1·6
June	492	16·4	June	79	2·6
July	2008	64·8	July	112	3·6
August	1311	42·3	August	50	1·6
Total	9860		Total	749	
Average per month,	821·6		Average per month,	62·41	
Average per day,	27		Average per day,	2	

Total number of consumers, 23,000.

From the above it will be seen the complaints put down to naphthalene stoppages over last year only averaged some 60 per month, as compared with 820 before the process was fully in operation; and if the return for September, 1903, be excluded (as the process had then only been recently introduced at both works), the average is reduced to 46 complaints per month on 23,000 consumers, and this number would probably have been further reduced by a more liberal use of the solvent employed, which for fifteen months has averaged only 0·109 gallon per ton of coal carbonized.

The total cost of working the process—including solvent, labour, pumping, &c., works out at 0·74d. per ton of coal used, or 0·07d. per 1000 cubic feet of gas made. Hence the cost is almost inappreciable, especially as we have a slight gain in illuminating power, due to no displacement of valuable illuminants in washing (excepting naphthalene, which I treat as an impurity on account of its liability to give trouble by depositing in a crystalline form) but rather a slight enriching effect due to carburetting.

I am glad to have Mr. Allan's testimony as to the benefit obtained from warm tar washing, and that Mr. Berridge, of Leamington, has found the process a complete cure, with a gain in illuminating power of about half-a-candle. Mr. Simmonds's letter in your last issue is also an independent confirmation of the utility of the Derby process, so successfully adopted with slight modifications at Bury. They are specially welcome, as I know these gentlemen for some years have given close attention to the naphthalene question, and have done valuable work in a quiet, unobtrusive manner.

I notice in referring to my process, on p. 98 of the "JOURNAL," you state that I wash hot gas with hot tar. This is slightly incorrect, and should read warm gas with warm tar, as we found from numerous tests that if the tar is too hot it will give up naphthalene again to the gas. In addition, I may point out there is another object in washing the warm gas with warm tar besides washing out the naphthalene; and that is so that the gas may pick up, and carry forward into the condensers, the light oils which are active solvents of naphthalene.

I must defer until some future time the results of our tests for naphthalene and solvents in the gas at various points, along with the experiments in washing with tar oil obtained from blast furnaces, creosote, paraffin, &c., extending over many months.

Derby, Oct. 13, 1904. J. FERGUSON BELL.

SIR,—I have read with much interest your extract from Mr. Colson's specification and the communications of your correspondents on the subject; and after making allowance for the ambiguous and comprehensive phraseology usually found in patent specifications, I confess that I am unable to discover any important feature which does not seem to be covered by Messrs. Young and Glover's patent, the object of which is clearly to either introduce into the naphthalene-laden gas the vapour of a solvent whose tension is near that of naphthalene or to directly wash the gas with the solvent.

Now I believe that Messrs. Young and Glover's process was first put to practical use at West Bromwich by Mr. Glover in 1900, and that the naphthalene complaints during the previous summers had been very numerous. These have now entirely disappeared; and were it not for an occasional accumulation in certain portions of the plant through which the untreated gas is passed, naphthalene would be unknown. The process in use is exceedingly simple and inexpensive, and consists of introducing commercial petroleum into the carburettor, and there vaporizing it. Formerly most of the oils, containing naphthalene in solution, were afterwards found in the syphons—in some cases at great distances from the works. With the object of recovering the oil on the works, I have recently added a suitable condenser, in which the gas is washed with petroleum vapour very effectively, and nearly 80 per cent. of the petroleum is recovered containing from 10 to 15 per cent. of naphthalene in solution. This liquid is subsequently pumped into a tank in the retort-house, and there gravitated into the pipes conveying blue water gas into the retorts, in which it is finally "cracked." We use about 10 gallons of petroleum per million cubic feet of gas made; in larger proportion during the summer months.

I find that about 65 per cent. of the oil we are using distils within the limits specified by Mr. Colson; and as its cost is only about 4d. per gallon, I am not at present tempted to obtain our requirements by means of the fractional distillation of tar.

West Bromwich, Oct. 15, 1904. HAROLD E. COPP.

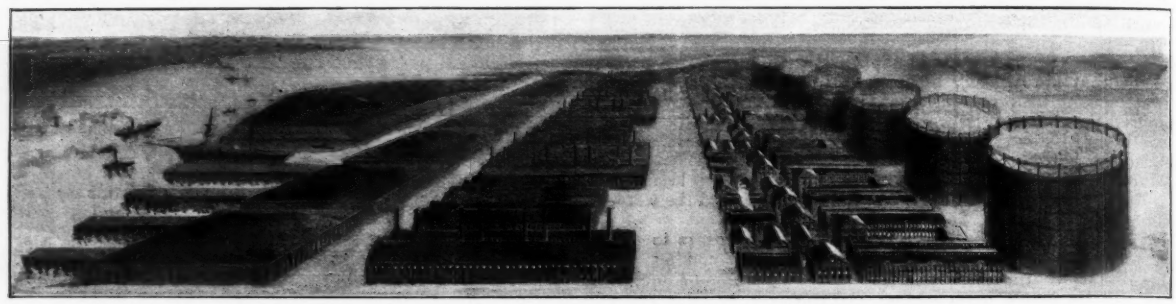
THE GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 204.)

THE brightening tendency on the Stock Markets which we noted last week continues to improve; and the Exchange has had another favourable week. Business in the Gas Market all through was bright and active. In this, as in some other departments, the attention of the public has been attracted by the low prices at which sterling good undertakings have been figuring; and the prospect of a fine return for their money is bringing them in as investors. The tendency was thus much the same as in the previous week, and several stocks continued to rise by steady, moderate steps. In Gaslight and Coke issues, the ordinary was very active, and could manage no longer to postpone the advance which we thought might well have been made the week before. From 95, the lowest price marked on Monday, the price gradually pushed up to 96½, at which figure a large number of transactions took place. The secured issues also were firm; and the maximum advanced a point. South Metropolitan was quiet, with just one transaction daily at good stiff figures. Two or three deals in Commercials were at fairly good prices; and the debenture stock recovered its lost half-point, though why it should be left standing so far below the other Metropolitan debenture stocks is a mystery. There was a moderate array of transactions in the Suburban and Provincial group, at fairly good figures. West Ham quotation was drawn in closer, and in the local Exchange Newcastle had a good rise. Among the Continental Companies, the feature was a smart advance in Imperial, which finished on Saturday by changing hands at 212. Of the remoter undertakings, Primitiva again engaged all attention—both the ordinary and the preference being very active every day. A little profit-snatching on Thursday put the price back for a while; but it quickly recovered, and closed as strong as ever. Melbourne bonds and San Paulo also showed a rise.

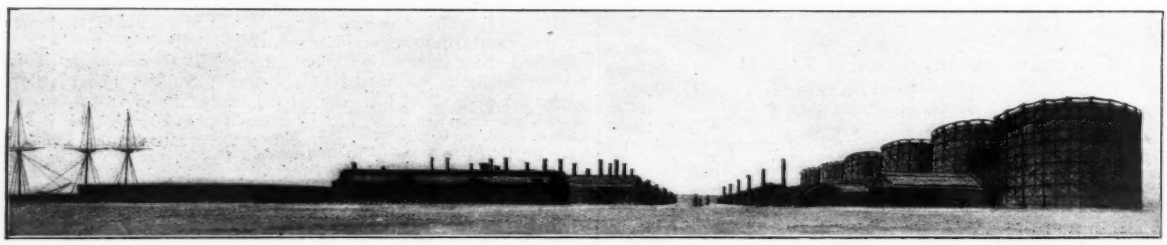
The daily operations were: Business was lively on Monday, and Imperial rose 1. Things were rather quieter on Tuesday, but prices rose—Gaslight ordinary and Imperial gaining 1 each. Wednesday was firm and unchanged. Thursday was strong and produced several advances. Imperial and Melbourne 4½ per cent. improved 2 each, Gaslight maximum 1, and West Ham and San Paulo ½ each. On Friday, Commercial debenture rose ½. Primitiva was put down ¼; but on Saturday it was put up again.

THE LARGE GAS-WORKS SCHEME FOR NEW YORK CITY.



Bird's-Eye View, from Artist's Drawing, of Mr. Bradley's Present Scheme.

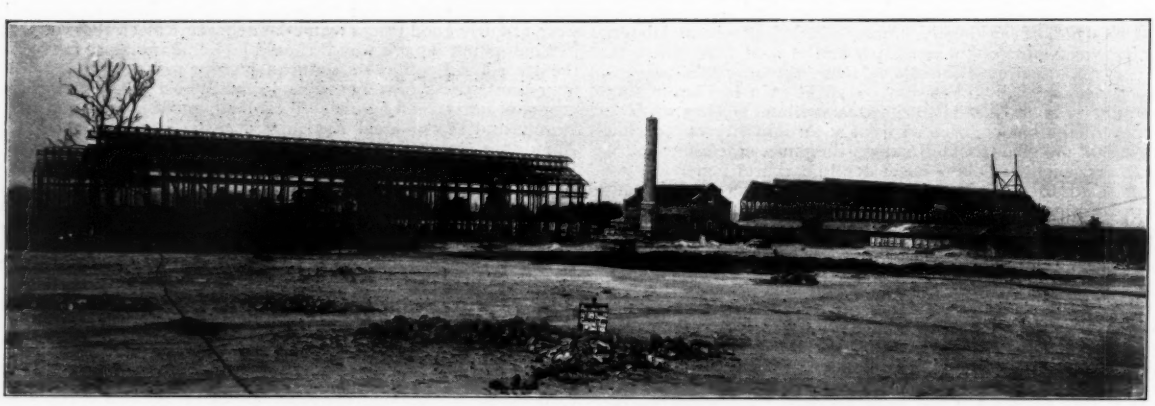
When Mr. W. H. Bradley, the Chief Engineer of the Consolidated Gas Company of New York City, was travelling this country and the Continent in the summer of last year for the purpose of inspecting the latest of gas-works construction and plant that could be offered him for consideration in completing his designs for the first section of the extensive gas-works concentration scheme that he had in hand for his Company, he kindly, through the "Journal" columns, gave to his European *confrères* a sketch of his proposals so far as he had determined them. The article will be found in the "Journal" for June 9, 1903. Since Mr. Bradley's return home, his plans have been carried into execution with true American vigour; and the structural work for the first unit has been pushed forward at an almost amazing pace, which throws a somewhat different complexion on the amount done than the brief communication from some of our British travellers on the other side just recently led us to suppose. Appreciating the interest that is taken in this country in the progress of new work of this character, Mr. Bradley has added to his former kindness by forwarding, under the care of a member of his staff (Dr. A. H. Elliott), a plan of the site of the new works, showing the disposition of the buildings forming the first section, together with a series of beautiful photographs of the building work as it has progressed. The latter are the highly creditable work of Dr. Elliott himself, whose skill as a photographer, with the examples before our readers, need no further word of praise. The most interesting of the photographs will be published week by week, until they are exhausted. For the present, our readers must be content with illustration as descriptive of the huge works now being reared by Mr. Bradley; the information which we are



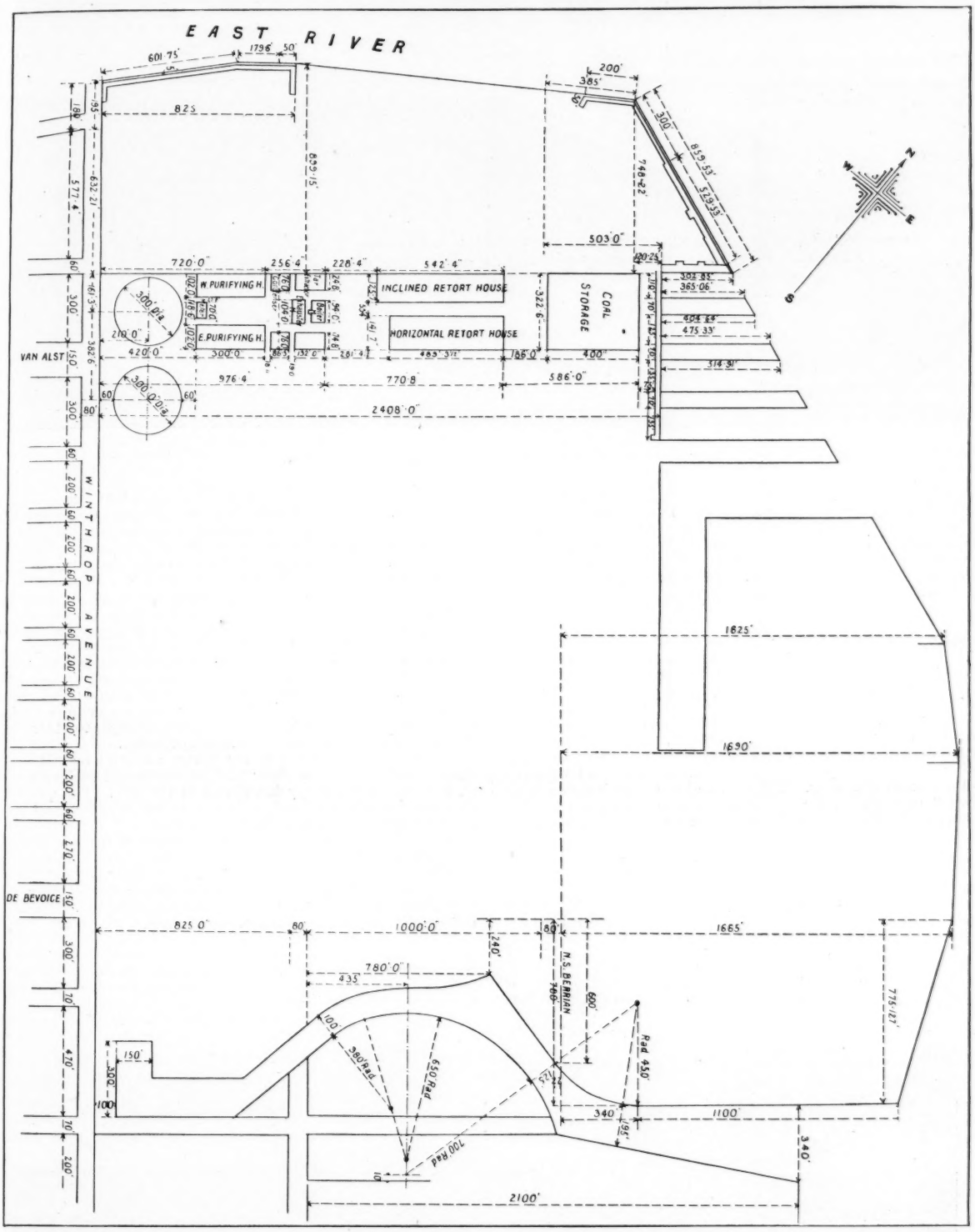
Perspective View of Above.

in a position to give for a time being of the most general character.

In the first place, two reproductions of photographs are given of drawings conveying a bird's-eye representation and a perspective view of the works as their designer has laid them out—that is, of course, assuming that invention or other considerations do not intervene to cause variations. These views, to that extent, are hypothetical, and not determinate. They are, however, interesting as conveying to the eye the vastness of the projected works. The plan of the works, showing, as it does, the location and dimensions of the buildings comprising the first unit of the works as they are being actually constructed, will engage the attention of every gas engineer, and a little explanatory information will assist in comprehending it. The site is on Long Island, about 7 miles north from the "Battery" on the East River, and a little to the north of the rapid currents of Hell Gate. The southern line of the property is Winthorp Avenue; the northern boundary is the irregular line of Flushing Bay; and the eastern boundary is an inlet from Flushing Bay, called the Berrian Creek. The entire property covers an area of about 350 acres. Measured along the Winthorp Avenue, the site is about 4500 feet long; and on its greatest line north to south it is some 3600 feet. On this large tract of land, the first works' unit, from the southern boundary to the extreme point of the farthest dock, occupies approximately 3000 feet and 600 feet from east to west. Between the East River and the first unit, space is left for a second unit; and the excavations for this are already being made. It will be seen that the works have been planned so that the coal is delivered by boat, and the operations of gas manufacture followed with systematic sequence through to the gasholders,



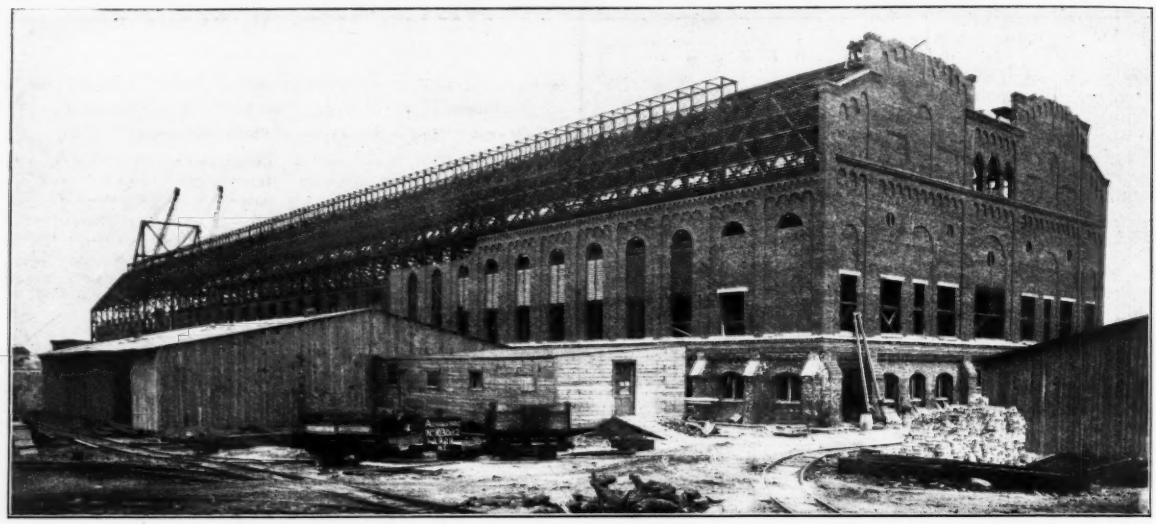
View Showing the Position of the Buildings on Sept. 12—The Two Purifier Houses, the Boiler House, and the Inclined-Retort House.



THE SITE PLAN OF THE ASTORIA WORKS OF THE NEW YORK CONSOLIDATED GAS COMPANY—SHOWING THE DISPOSITION OF THE PLANT ON THE SECTION ALREADY UNDER CONSTRUCTION.

which are situated on the extreme boundary, and in a straight line to the point where the coal is received.

Taking first the docks. At the present time the work completed consists of a dock of some 900 to 1000 feet, on the eastern side of East River; and about 1500 feet of dock crib, extending from the corner of East River and Flushing Bay. It is now being filled in by dredging in the easterly channel. Along this point, from the corner of the East River and extending in an easterly direction into Flushing Bay will be the docks for coal storage; and these are from about 400 to 600 feet long—the lengths varying with the irregularity of the boundary line. These coal-docks will take boats of about 4000 tons burthen. Immediately at the south of the docks is the coal-store, which is 322 ft. 6 in. by 400 feet long. The store will be fitted with the most improved machinery for handling the coal economically and rapidly. Throughout the design of the works, no expense it is known has been spared in ascertaining the relative merits of different kinds of plant, and in securing improvements. To the rear of the coal-store are the retort-houses. The one to the west is the inclined retort-house, which is practically a replica of that which was built by Mr. Edward Drory at Mariendorf (Berlin) for the Imperial Continental Gas Association. The structure is about completed, as will be seen on next page. We shall be giving photographs which will illustrate the various parts of the work of construction in greater detail. The house covers an area of 542 ft. 4 in. by 125 ft. 7 in. A small point, but one which is a novelty in its way, is that the windows of this house are to be glazed with wire glass. This is composed of two sheets of glass with a wire network between; and the whole is rolled together, so that if the glass becomes fractured, it will not fall out. This is a French idea; the originator being M. Leon Appert. Within the house, too, at one end, lavatory accommodation has been provided for the men.



THE INCLINED-RETORT HOUSE—PHOTOGRAPHED ON OCT. 2.

The foundations for the settings are in; and the work of equipment is being rapidly proceeded with. The contract is in the hands of Messrs. Bartlett, Hayward and Co.; and the settings will be entirely on the Stettiner system. The house will contain 64 beds of nine 20 feet tapered retorts, 16 in. by 22½ in. by 16 in. by 25 in. On the eastern side of the inclined-retort house, is one for horizontal retorts. The dimensions of this are 489 ft. 3½ in. by 141 ft. 7 in. The foundations of the house are in, and ready for the ironwork superstructure. It will contain 120 beds of eights, 16 in. by 26 in. by 21 ft. 9 in.; and the retorts in each bed will be set in two vertical tiers. It is probable—though we cannot speak definitely on the point—that De Brouwer projectors will be used in their operation. When Mr. Bradley was over this side, he purchased a De Brouwer machine for trial; and it has been undergoing a severe test at the 14th Street works. The projector laboured there under many disadvantages. The house is a low-roofed one; the retorts are packed very close together; and altogether the arrangements for the experiment were of a temporary and makeshift character. Yet, considering these obstacles to its efficient operation, the machine appears to have given a satisfactory account of its capabilities. Among other experiments, a wooden model of a retort was rigged up, with the top removable, in order to ascertain the character of the distribution of the coal in the retorts. A photograph of this wooden retort containing a charge will be published in due course.

Directly, again to the south of the retort-houses come the boiler-house; and beyond this the exhauster-house. To the east and west of these buildings, are the tar-extractors, condensers, washers, &c. The contracts for the condensers, ammonia washers, &c., we believe have already been let; but with regard to the question of cyanide recovery, this is a matter that is still in abeyance. Succeeding these portions of the plant are the two purifying-houses, which are each 300 ft. by 102 ft. Between them is the meter-house, which is a building 70 ft. by 47 ft. 5 in. Finally, and almost touching the line of Winthorp Avenue, are to be the pair of gigantic holders, each of a capacity of 20 million cubic feet; and consequently they will be the largest gasholders in the world. The diameter of each will be 300 feet; and the work of excavation for the concrete tank of the first one is now well under way. The soil here is all of a sandy nature; and great precautions have had to be taken to secure water-tight tanks. These will be 42 feet deep. But all particulars as to their construction must be reserved for a future occasion.

For the supply of water to the works, an artesian well some 350 feet deep has been sunk; and the water is found to be as good as the Croton water distributed in the city. The quantity available has not yet been determined; but it is believed that the wells will yield as much water as is wanted.

This gives just an outline of the character of the first section of the new works, which will have a productive capacity of 20 millions. It is noteworthy that coal gas entirely holds sway in it. The scheme contemplates six sections; but whether the others will consist of water gas or coal gas or the two combined will depend very much on future experiences.

GENERAL VIEW OVER THE SITE—THE EAST RIVER IN THE DISTANCE AND THE 60-INCH STEEL GAS-MAINS IN FRONT.

Another piece of work of great magnitude will be the tunnel under the East River, which is to connect up these works with New York City. This will run from Winthorp Avenue to 111th Street in the city; but this will be a work which will absorb several years in construction. Meanwhile a 60-inch steel riveted main has already been laid from Winthorp Avenue through Van Alst Avenue, and well on to the Ravenswood Gas-Works. In some places, this is 25 feet below the surface. Connection will be made by it with the holders at Ravenswood, which will be used for storage on the starting of the new works.

THE CONSOLIDATED COMPANY'S MUTUAL AID SOCIETY.

In the conversation with Dr. Elliott, it was apparent that the whole of the management and staff of the Consolidated Gas Company—including the President (Mr. H. E. Gawtry) as head of the former and Mr. Bradley as chief of the latter—have the interests of the men in their employ very much at heart. Incidentally Dr. Elliott mentioned that one thing they were working at now was an attempt to induce the men to help themselves through the channel of a Mutual Aid Society. It is called the Gas Company's Mutual Aid Society; and the membership now comprises from 1600 to 1700 men. One of the objects is assistance in all cases of death. A member pays into the fund 50 c. a month (that is practically 2s.); and when he dies, his family receives $300. There is also a friendly aid fund, in which each member pays 30 c. a month; and, if he falls sick, he obtains $1 a day, medical attendance, and medicine. Into both of these funds, the Company pay 50 c. for every $1 paid by the members, and, in addition, the Company discharge the expense of the doctor's services under all circumstances. During the existence of this organization, $65,000 have been paid out for claims of various kinds; and there are about $25,000 in the treasury. The Society and the funds are growing; and some important developments may come pretty soon—there being certain proposals on the *tapis* which will greatly extend its usefulness, if the way is clear for their adoption. Everybody in the Company, from the President and Directors, and Mr. Bradley downwards, are members; and so the term "mutual" has its full meaning put into practice here. The identification of the management and the officials in this way has, it may be remarked, a wonderful influence. The balance in hand, too, is invested in the Company; and upon it 5 per cent. interest is allowed. Dr. Elliott, by the way, is now serving his second term as President. We congratulate him; as well as thank him for these particulars, and for being the bearer to us of so much that is of technical interest.

Mr. ROBERT ENGLISH, F.C.S., the Engineer of the Christchurch, N.Z., Gas Company (a position which he has occupied for the past twelve months), is now on a visit to this country for the purpose of purchasing plant for his Company. Any communications for him may be addressed care of Messrs. Coward and Co., 91, Finsbury Pavement, E.C.

At last Thursday's election to the Royal Masonic Institution for Girls, Violet Hunter (daughter of the late Robert Hunter, of Chester) was returned fourth on the list—the friends who have been interesting themselves in the case securing 4881 votes. For this satisfactory result—and for it Mrs. Hunter asks that her grateful thanks may be conveyed to all the brethren who have personally helped her—the Province of Cheshire gave 1900 votes and Yorkshire and West Lancashire some 270 votes.

The "Pall Mall Gazette" states that among the Government Bills likely to be submitted to the next session of Parliament will be one asking for power to be given to councils and corporations to grant pensions to officials and other servants. The Government, through the Local Government Board, are collecting the opinions of local authorities on the subject; and if a definite approval is given, a Bill on the lines of the Superannuation of the Poor Law Officials Act of 1886 will be included in Mr. Long's batch of legislative measures.

The death is announced, on the 24th ult., of Herr GUSTAV WAHL, the Superintendent of the municipal gas-works of Güstrow, in Mecklenburg-Schwerin. The deceased was well known among German gas engineers for his careful studies of the processes which it was his duty to control, and it is said that the works books at Güstrow were thereby made most instructive records of sound practice in the operations of gas manufacture. Reference has been made recently in the "JOURNAL" to his trials of water gas for self-carburetting; but unfortunately he has been called away before their completion. He was only 48.

Mr. EDWIN TROUNSON, J.P., the Chairman of the Gas Committee of the Southport Corporation, has been unanimously selected for the position of Mayor for the ensuing year, and has accepted the office. During his chairmanship, the gas-works have been reconstructed, a change of engineers has taken place, the standard illuminating power of gas has been lowered, an amicable settlement come to with Birkdale, and a long-standing dispute closed. He has served as Chairman and Vice-Chairman of the Committee since 1899. A great proportion of his spare time has been devoted to studying the best methods of gas management. He has made himself acquainted with representative gas-works, and he is looked upon in neighbouring counties as quite an enthusiast in this department of industry.

ELECTRIC LIGHTING MEMORANDA.

Serious Revelations at Walthamstow—Further Evidence for the Northumberland Clauses—The Story of a Church Fire—The Interpretation of Mistakes and Plain Statements.

THE financial arrangements of municipal electrical undertakings are receiving a good share of attention and criticism just now, and necessarily so, for there is a painful want of soundness about some of them. Walthamstow and Hastings are going through the mill. In the former, we are particularly interested, because the electricity generating station is there worked by producer gas; and the figures as to generating costs stand comparison with those of many important stations using steam as motive power. The Engineer, too, has just been entrusted with the similar duties in connection with the dearly-acquired undertaking of the Marylebone Borough Council. But these interesting facts do not minimize the gravity of the charges made against the Walthamstow Council in the administration of the electricity supply. The truth came out at an inquiry by the Local Government Board into an application for sanction to borrow certain amounts, making in the aggregate £46,224, for electric lighting. Local authorities have been warned often enough of the danger they run in expending money before sanction is obtained. To take such a course is simply befooling the Local Government Board and holding in contempt the statutory requirements in respect of the expenditure of money by local authorities. The Walthamstow Council ought to have known, and assuredly they did know, better than to have committed such a breach of their powers as the expenditure of £17,850 on the electrical undertaking in excess of the sanctions up to Aug. 31, 1903. This sum was included in the above-mentioned £46,224; and no doubt the Board will now take the opportunity of administering to them a lesson sufficiently smart to deter them leaping the bounds on a future occasion. It is all very well for the Council to plead that the greater portion of the £17,850 is a legacy from their predecessors. They admit they are responsible for a portion of it; and if the matter was looked into, it would be found that there is a striking family likeness between the members of the former and the present administration. But worse than all this, there has been such looseness in the local government, that much of the expenditure has been incurred without the sanction of the Council. The Lea Bridge Gas Company, members of the Council, and among the latter the Chairman of the Finance Committee, laid some startling evidence on this and other questions before the Inspector at the inquiry; and it will be found reported elsewhere in this issue. Their testimony is summed up in a general accusation of extravagance, an utter want of care, and a wilful disregard of the pockets of the ratepayers. Miles of cables it is asserted are now lying dead; and to build up profits, the Council have made themselves their own largest consumers, and are imposing on the ratepayers an extortionate price for the public lighting service. For the lighting of side streets, they are charging £7 15s. per year for each 32-candle power incandescent electric lamp; while the Lea Bridge Gas Company are prepared to give them 72-candle power incandescent gas-lights for £4 each. The Chairman of the Electric Lighting Committee under the former Council admits that they were deceived as to the lighting value they would get from the incandescent electric lamps in comparison with incandescent gas-lamps. It is absurd to talk airily of "profits," and to assert that the undertaking has never cost the ratepayers a half-penny when they have to "pay through the nose" for street electric lighting in this way. This inquiry is seemingly only the beginning of trouble at Walthamstow over these matters; but if it is the commencement of the clearing away of monstrous financial abuses in connection with the electricity supply, it will have served a good purpose.

More evidence is to hand of, first, the determination of the Local Government Board to insist on the finances of municipal electrical undertakings being placed on a sound foundation; and, secondly, of the necessity of the application to them of the Northumberland clauses. If the provision as to street lighting had been in operation in the case of Walthamstow, the District Council would not have been able to have played "ducks and drakes" with the ratepayers' money, through the public lighting, in order to show a respectable profit on their electricity undertaking; nor if the other clauses had been in operation in the case of Hastings would the Corporation have had an accumulated deficit of £4468 8s. 11d. on their electricity business, which the ratepayers are now to meet to the tune of £1500 a year, supplemented perhaps by a further current deficit. The matter has been brought up in this way: The Council made an application to the Local Government Board for sanction to the borrowing of £3416 for electric lighting; but the Board found that from 1900 to 1903 there had been each year a deficit on the electricity undertaking—the deficit carried forward on Dec. 31 last amounting to the aforementioned £4468 8s. 11d. Before granting the application for power to borrow further money for electric lighting, the Board put this pertinent double-barrelled question to the Council: What steps did they intend to take with a view of wiping out the deficiency brought forward at the beginning of the year, and of preventing a recurrence of these deficits. An intimation that the Committee intended to recommend the Council to provide in the estimates for £1500 a year until the deficit is wiped out, did not satisfy the Board; they wanted the actual resolution of the Council

undertaking to do it. The necessary resolution was passed by the Council at their last meeting; but it does not dispose of the second part of the information required by the Board, as to what steps are going to be taken to prevent in the future a recurrence of these deficits. We hope that the Board will insist on having a full and satisfactory answer to this question. As it is, the ratepayers have got to provide now for the arrears of deficits, as well as for any that may occur in the present or future. Just as we hold that every undertaking should stand unsupported on its own bottom, so, where the future contains unknown financial quantities, we believe in every year bearing its own burdens. Inefficiency has marked the municipal control of the electricity supply concern at Hastings; and there are several members in the Council who recognize it. The business has been treated as no man in the Council would treat his own private business, unless he was possessed of the insane desire to secure the insertion of his name in the "London Gazette." The general ratepayers are to feel the effects now of the maladministration of the concern. A sum of £1500 a year is not much perhaps spread over the whole body of ratepayers; but is that to be all in the immediate years? The whole body of ratepayers include the Gas Company and all non-electricity consumers. But when we ask, Why they should pay? there is never a rational answer forthcoming. This kind of thing is enough to make the ratepayers who do not use electricity indulge in a little "passive resistance"—anyway it will not be surprising if soon we see ratepayers in towns with unprofitable electricity undertakings join forces with gas companies *qua* ratepayers in asking Parliament to compel the charges for electricity to be on a scale sufficient to meet all outgoings and charges. Here we have, in this Hastings case, another authority starting works before the loan for them has been sanctioned.

Two to three weeks ago, the church of St. Chrysostom, Manchester, was destroyed by fire; and the cause of the fire was laid to the charge of the electrical wiring. There is, however, nothing but circumstantial evidence to go upon; and that evidence is not of a sufficiently satisfactory nature to enable anyone to conclude whether electricity, gas, or something else was responsible. But to electricity was attributed the cause; and this very naturally set the electricians to work to inquire into its truth, and to find an alternative scapegoat. It was rather an inconvenient thing for the electricians that the supply of electricity to the church was a new one, and that the service was only completed on the Friday previous to the outbreak of the fire—the lights being switched on for the first time on the Saturday. In a report on the occurrence by the Corporation Electricity Engineer (Mr. S. L. Pearce), it is stated that careful tests of the system in the church were made on that day by the department's own inspector. "At 6.45 p.m., one of the double-pole switches was switched off altogether by the contractor's foreman; and through the second double-pole switch, a supply to two fittings only in the choir was being given. *Four hours after the supply had been switched off, the fire was discovered.*" Looking for alternative causes, the Corporation inspector who connected up and tested the installation reports that there was a large fire in the vestry burning all the rubbish which had accumulated during the alterations, and a gas-ring was in use at the back of the organ for hot-water purposes. Just recently—we want to emphasize this in connection with what follows—we have been exhorted to deal justly with the electrical industry, though it is always our endeavour to do so. A second report has been made on the disastrous occurrence by the Emergency Committee of the Contractors' Association; and a very fair report it is. But referring to it, the "Electrical Review" says: "It takes the blame off the shoulders of electricity and lays the responsibility to the account of a rival illuminant, which we are confident causes a good many more fires than it generally gets credit for." Turning to the report to see how far our contemporary is justified in its statement as to responsibility, we read:

> There seems to be no doubt that the fire originated in the immediate neighbourhood of the organ chamber. There is distinct evidence of an escape of gas in the organ chamber, which was only slight so long as any through draught existed, but which accumulated to an unpleasant extent after all doors *had been closed throughout the night*. The escape was vouched for by the rector and verger, and by the contractor and his staff. A gas-ring burner had been in use throughout the day in the organ chamber; but the cleaners state that it was cleaned and put away on the Saturday, and that the gas-jet in the organ chamber was turned off. The gas had not been turned off at the main, however. The Committee is of opinion that the fire did not arise from any electrical cause, and that the escape of gas suggests a possible source of danger, though there is not sufficient evidence to show the actual source of ignition.

On this report, is the definite assertion of the "Electrical Review" treating the gas industry with the justice that is demanded for the electrical industry? In the first place, it required the church to be closed throughout the night for the gas (over which the rector, verger, electrical contractor, and his staff showed negligence in not taking steps to prevent the continuance of the escape) to accumulate to an "unpleasant extent;" secondly, the gas-ring was cleaned and put away; and, thirdly, the gas-jet in the organ chamber was turned off. "There seems to be no doubt that the fire originated in the immediate neighbourhood of the organ chamber." That being so, were there any traces of an explosion "in the immediate neighbourhood of the organ chamber," was one heard by anybody, and can anyone show where there was a possible source of ignition? If escaping gas was responsible, there must have been a point of ignition and an explosion. Where, then, in the report or the evidence is the justification for the laying of the "responsibility to the account of a rival illuminant?" Perhaps the "Electrical Review" will tell us, remembering that there "seems to be no doubt" as to where the fire originated.

In regard to the little passage-of-arms between the "Electrical Engineer" and ourselves, we can now contentedly leave our contemporary. In some further rambling remarks, the Editor, or the gentleman who contributed the original homily, has adopted—and there was room for it—a more temperate tone. In the homily, there was a statement which was deplorably defective for a man who preaches; in the torrent of abuse which disgraced the paper on Oct. 7, there was an expression as to the "JOURNAL" delving in dirty ditches, to which any reasonable and intelligent man could only apply one interpretation. That interpretation is now denied as being correct; and the writer in our contemporary has, by a great effort of the imagination, thrown into the words (in order to escape from their odious import) a meaning which no one else, we venture to think, could have given them. The "Electrical Engineer" can go on indulging in wordy obscurities. We have no more time or space to spare in assisting to shed light upon their meanings. The interests of the gas industry are of more importance to us; and one of those interests is that of being large ratepayers. Where we believe that that interest is threatened or affected by municipal trading in electricity (such as in the cases of Walthamstow and Hastings, commented upon above), there will be no hesitation—the "Electrical Engineer's" mild or truculent attacks notwithstanding—in laying bare the matter for the benefit of the gas industry and ratepayers generally. The truth is not always palatable to some people.

A GERMAN MANUAL ON GAS-FITTING.*

THE neat little volume of 220 pages which is before us aims at stating succinctly all that the main and service layer and gas-fitter need and ought to know to guide them in performing their varied tasks aright. The aim has, we consider, been achieved in as satisfactory a manner as possible. The author does not pretend that anything short of many years' devotion to his craft will make a man a skilled gas-fitter; but if he bears this reservation in mind, the apprentice or beginner will gain much assistance from the study of Herr Kuckuk's handbook.

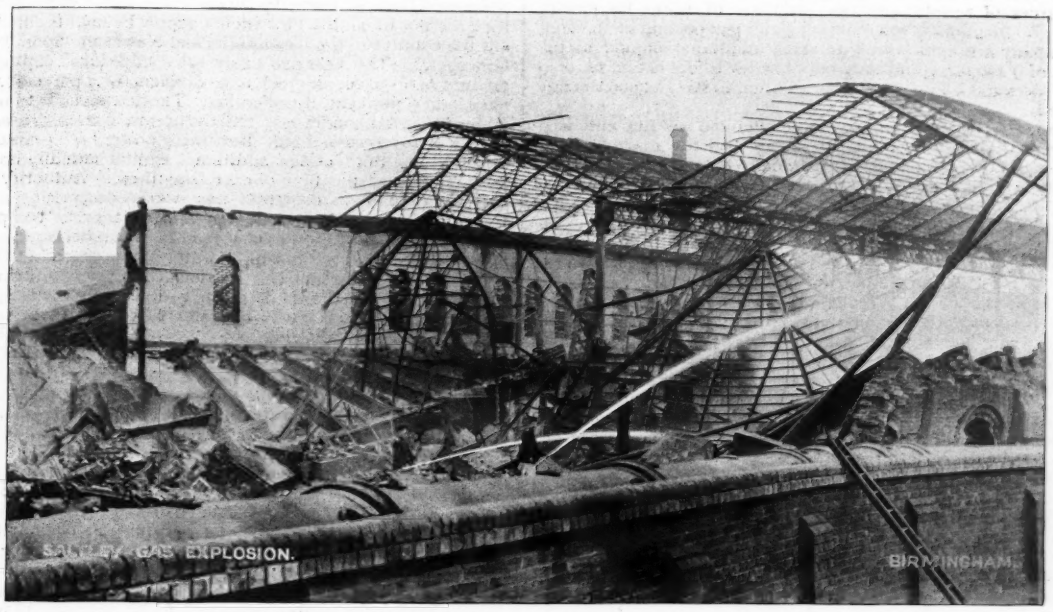
Probably few readers of the "JOURNAL" of the class for which the book is written will be sufficiently familiar with the German language to be able to avail themselves directly of its contents. Their *confrères* in Germany and Austria are more especially concerned with it; and the author was therefore justified in describing typical German machines and apparatus rather than corresponding English types. Had he anticipated a demand for his book in English-speaking countries, Herr Kuckuk must certainly have realized the wisdom of giving diameters of pipes and mains in inches as well as in metric units; whereas only in a few connections—as for instance meter-unions—does he give dimensions in inches. Consequently, many tables and data in the book have no direct value to English fitters and engineers. With this reservation, however, there is much of cosmopolitan utility in the treatise; and it is worth while to furnish a synopsis of its contents for the guidance of prospective purchasers.

The book opens with particulars of a town distributing system, the pipes suitable for trunk mains, and the methods and precautions requisite for laying them. Then the branch mains are dealt with; and this leads up to house services. Next consumers' meters and governors are explained, and then comes information on house fittings. Burners are appropriately dealt with next; and the up-to-date attitude of the author may be judged from the following words, with which this branch of his subject is opened: "We have now to go on to speak of the burners; and it is scarcely necessary to mention that at the present time incandescent lighting almost exclusively has to be considered, and that flat-flame and argand burners have only historical interest. The same applies to regenerative lamps, which twelve to fifteen years ago played a prominent part in gas lighting." And with two or three lines more, Herr Kuckuk dismisses both flat-flame and argand burners, and proceeds to devote 15 pages to the incandescent system in its various developments. Perhaps if he had been aware of the recommendation of the recent Departmental Committee on Metropolitan Gas Testing, to the effect that testings should be made with flat-flame burners "for information," he would not have dismissed these burners so cursorily! It would be interesting to hear his opinion of this recommendation.

The next matters dealt with in the book are street lighting, and cooking and heating apparatus. The work concludes with 25 pages on gas-engines, &c., and a brief bibliography of German gas literature. The text is interspersed with 234 illustrations, which for the most part are quite appropriate and useful.

* Der Gasrohrleger und Gaseinrichter. Ein Handbuch für Rohrleger, Gaseinrichter, Monteure, Gas- und Installationsmeister. Von Friedrich Kuckuk, Director der stadtischen Gas- und Wasserwerke zu Stolpi. München und Berlin: R Oldenbourg; 1904.

EFFECTS OF THE EXPLOSION AT THE BIRMINGHAM (SALTLEY) GAS-WORKS.



In last week's "JOURNAL," we gave some particulars received by telegram on Monday afternoon in regard to the disastrous explosion which took place that morning at the Saltley Gas-Works of the Birmingham Corporation. Some idea of the immense destruction to property caused by the accident will be obtained from the photograph reproduced herewith, for which we are indebted to Messrs. Fred. Jones and Sons, of Temple Row, Birmingham. Further information in regard to the catastrophe transpired at the opening of the inquest last Friday (as reported on p. 189); and it will be noted that the inquiry has been adjourned until the 14th prox. Meanwhile, the funerals of the three victims took place on Sunday, when thousands of people lined the routes leading to the places of burial. Wreaths were sent in each case by the Lord Mayor (Alderman Sir Hallewall Rogers) and the Lady Mayoress, as well as by Mr. Henry Hack and Mr. T. R. Murray, and by many other sympathizers. The first funeral was that of Charles Gibbins; and among those who attended were Mr. Henry Hack, Mr. Hampton Barber, Mr. T. R. Murray, Mr. L. O'Shea, and the General Secretary and the Organizing Secretary of the Amalgamated Society of Gas-Workers.

WATER ACTS FOR 1904.

In previous issues of the "JOURNAL," an indication has been given of the scope of the legislation of the past session in regard to the supply of gas. We now deal with the Acts relating to water supply, beginning with those obtained by Companies.

The Amersham, Beaconsfield, and District Water Act confers upon the local Water Company power to further extend their limits of supply so as to include the parish of Gerrard's Cross, in Buckinghamshire; but if, after the expiration of five years from the passing of the Act, they are not furnishing or in a condition to furnish on demand a sufficient supply of water to the parish, any local authority who but for the Act would have had the power may undertake the work. The Company are authorized to lay a pipe-line for the supply of the added district, and to carry out any incidental works that may be necessary, all of which are to be completed within five years. The Company are not to draw from any well within the county of Buckingham, or collect and appropriate any water obtained within that county, for supply elsewhere. The Eton Rural District Council are, for the purposes of sections 35 and 36 of the Water-Works Clauses Act, 1847, to be deemed the owners or occupiers of houses within the limits of the Company, and consequently entitled to demand a supply of water. Clauses are inserted for the protection of the Great Western and Great Central Railways Joint Committee.

The Act obtained by the Barnet District Gas and Water Company authorizes them to acquire certain lands in the parish of Shenley, in the rural district of Barnet, for the construction of a reservoir, and to raise additional capital. The Act contains important sections for the protection of the County Councils of Middlesex and Hertford; it being enacted that it shall not be lawful for the Company to supply water, in bulk or otherwise, beyond their limits, without the consent in writing of the Councils. The additional land which the Company may acquire or lease in the former county is limited to 5 acres, and they must not sink a well upon it. In Hertfordshire, they may take 15 acres, but none outside their supply limits. In the event of any difference arising between the Council and the Company, in regard to this section, it is to be settled by an engineer appointed by the President of the Institution of Civil Engineers. The reservoir is to be completed within three years from the passing of the Act. The Company are given power to hold lands for the protection of their works or supply against pollution. Section 54 of the Act of 1847, which requires that persons using water are to provide cisterns and the fittings connected therewith, is to be in force within the whole of the Company's limits, notwithstanding that the supply is to be constant. Owners, in certain specified cases, are to be liable for the water-rates; but these may be recovered from the occupier, who can deduct them from the rent. The Act contains a number of provisions relating to constant service in Finchley and the protection of the District Council. The Company are to supply the Council with water by meter for certain purposes at the rate of 1s. per 1000 gallons for the first million gallons per quarter; and at a reduction of 1d. for each additional million up to 3 millions—any quantity beyond this to be charged at 9d. per 1000 gallons. The Company are not to supply water for the purposes specified, if it would in any way interfere with the domestic supply. The rates to be charged for other meter supplies are set out. The Company are not bound to supply water otherwise than by meter to any workhouse, hospital, barrack, or other large building occupied by persons living in community, except on such terms as may be agreed upon. Additional "D" water capital not exceeding £150,000 may be raised; and the dividends payable on it are limited to 7 per cent. upon ordinary, and 6 per cent. upon preference capital. New shares or stock are to be put up to auction or tender; and those not sold are to be offered to share or stock holders. Borrowing powers are given to the extent of one-fourth of the additional capital authorized; and debenture stock may be created.

The Bexhill Water and Gas Act empowers the Bexhill Water and Gas Company to raise further capital, construct additional water-works, and extend their limits of supply so as to include the places mentioned in the notice of the gas portion of the Act which appeared in the "JOURNAL" for the 4th inst. (p. 20). The new works authorized comprise wells, pumping-stations, conduits or pipe-lines, a service reservoir, and a road in the parish of Ninfield, and a well or wells, a pumping-station, and a conduit or pipe-line in the borough of Bexhill. Provision is made for the new wells to be lined or made water-tight for a depth of 40 feet from the surface of the ground, or such depth as may be necessary to prevent the percolation of surface water. The new works are to be completed within seven years from the passing of the Act. Power is given to hold lands for the preservation of the water-works from pollution. Special provisions are inserted for the protection of the Earl of Ashburnham, Baron Brassey of Bulkeley, the Corporation of Bexhill, the County Council of East Sussex, and the Rural District Councils of Hailsham and Battle. With regard to the Corporation, it is enacted that after the expiration of two years from the passing of the Act, the borough is to have a constant supply of water. If the water is cut off from any house, notice in writing is to be given to the Corporation within 48 hours, or penalty of 10s. will be incurred. The

Medical Officer of Health, the Borough Surveyor, the Sanitary Inspector, or any civil engineer authorized by the Corporation, may, on giving like notice, inspect the reservoirs, filter-beds, and sources of supply, and take samples of water for examination. As mentioned when noticing the gas portion of the Act, the Company are empowered to raise additional capital to the amount of £120,000; and they may borrow to the extent of one-third of the total issued capital, in addition to the £20,000 already borrowed.

The Brymbo Water Company have obtained an Act authorizing an extension of their limits of supply and the raising of additional capital. An agreement had been entered into between the Company and the Rural District Councils of Holywell and Hawarden, in the county of Flint, for the supply of their districts; and this has been confirmed by the Act. Should any difference arise as to the sufficiency of the supply, it is to be settled by an arbitrator appointed by the Board of Trade on the application of any of the parties. Of course, the Company are not to encroach upon the district of the Wrexham and East Denbighshire Water Company, without their consent in writing. The water is to be constantly supplied, but not under a greater pressure than can be obtained by gravitation. The Company may raise additional share capital to the extent of £25,000, including premiums; and it is to be offered by auction or tender. Shares remaining unsold may be offered to shareholders, employees, or consumers. In respect of the additional capital, the Company may borrow to the extent of one-third of the amount actually issued. Provision is made for the supply of water in bulk and by meter.

The Gosport Water Act empowers the Gosport Water Company to construct additional works, acquire the undertaking of the Lee-on-the-Solent Water Company, Limited, extend their limits of supply, and raise more capital. The new works contemplated comprise a well and pumping-station in the parish of Soberton, a covered service reservoir in the parish of Shedfield, three aqueducts or pipe-lines, and subsidiary works. If, in consequence of pumping at the Soberton well, any existing well within a radius of a mile and a half therefrom, or the River Meon within that radius, should be depleted or diminished, the Company are to make good the supply or compensate the owner in money—any difference between the parties to be settled by arbitration. The new works are to be completed within three years from the passing of the Act. This period is also granted for the signification of the Company's desire to purchase the undertaking of the Lee Company, which is to be by agreement or arbitration under the Lands Clauses Acts. Authority is given to the Company to discontinue their existing pumping-stations at Foxbury and Bury Cross, in the parish of Alverstoke, or either of them, and the works incidental thereto, at any time after the works sanctioned by the Act have been constructed. The limits of the Company, as extended, will include the above-named parish and other places in the county of Southampton. The Company may raise new capital to the amount of £56,000 by the issue of ordinary or preference stock, the dividend to be limited to 7 per cent. on the former and 5 per cent. on the latter. The new shares or stock are to be put up to auction or tender, and those not sold are to be offered to the shareholders. Borrowing powers to the extent of one-fourth are granted in respect of the additional capital authorized. The Act contains ample provisions for the protection of the London and South-Western Railway Company, the Southampton County Council, and the Fareham District Council.

The Littlestone-on-Sea and District Water Act incorporates a Company, with power to construct works and supply water in the parishes and boroughs of New Romsey and Lydd, and the parishes of St. Mary-in-the-Marsh, Hope, All Saints, and Dymchurch, in Kent. Littlestone-on-Sea has for some years derived its water from private works provided by Mr. H. T. Tubbs, who owns the greater part of the property. The new Company consists of himself, Messrs. Edwin and Arthur Finn, Mr. R. W. Perks, and others. The authorized capital is £36,000 in £10 shares, with borrowing powers to the extent of £12,000. Of this sum they may raise £3000 in respect of every £9000 of capital, under conditions which are fully set out. The Company are to acquire the existing works, and they are empowered to construct others, consisting of two wells and pumping-stations and a service reservoir in the parish of Lydd, and four aqueducts or pipe-lines, which are to be completed within five years from the passing of the Act. The water is to be constantly supplied at such pressure as can be afforded by gravitation from the service reservoir or water tower authorized by the Act. The rates at which water is to be supplied are as follows: Where the rateable value of the premises supplied does not exceed £6 per annum, 2d. per week; above £6 and under £30, a rate not exceeding 7½ per cent. per annum on the rateable value; above £30 and under £50, 7 per cent.; above £50 and under £70, 6½ per cent.; above £70 and under £100, 6 per cent. The Company are not bound to furnish a supply for any less sum than 8s. 8d. a year; and they must not charge more than one-half for unoccupied houses. Provision is made for supplying by meter; and these instruments are to be kept in repair by the consumers using them. The Company have power to make agreements with owners, lessees, and occupiers of lands for securing the purity of the supply.

The Newcastle and Gateshead Water-Works Act enables the Newcastle and Gateshead Water Company to extend their limits of supply so as to include the urban districts of Blyth, Cowpen, Earsdon, and Seghill, and several parishes or townships and other places in the county of Northumberland. If any authority whose district is wholly or in part within the extended limits shall desire a supply of water in bulk, the Company are to furnish it, unless prevented from so doing by unavoidable cause or accident; but they are not to contract for such a supply beyond the limits without the consent of the Corporations of Newcastle-upon-Tyne and Gateshead. The Company may raise additional capital to the amount of £150,000, limited to a dividend of 7 per cent. if ordinary, and 5 per cent. if preference. The new stock is to be issued under the usual conditions; and the premium arising thereon is to be placed to a reserve fund. Borrowing powers are granted to the extent of one-third of the additional capital actually issued and fully paid up at the time of exercising them. Authority is given to the Company to construct new works, comprising a service tank in the parish of Stannington and another in the parish of Newburn Hall, both in the county of Northumberland; and they are not to be required to supply water within the added limits at a greater elevation than can be reached by gravitation from the first-named tank. Power is given to the Company to lay mains in certain specified areas, in order to enable them to supply water to any other district.

The New River Company's Act is to make provision for the application and distribution of the water stock issued to the Company in discharge of the sum payable as compensation for the transfer of their water undertaking to the Metropolitan Water Board, and for the reconstruction of the Company, and its registration under the Limited Liability Acts. The measure under notice is the outcome of a provision in the Metropolis Water Act, 1902, to the effect that the Company should, in the next or the next succeeding session after the passing of Act, introduce a Bill for the above-named purposes. The capital of the Company consisted of the original Adventurers' and King's shares, 5000 new shares created under the Act of 1866, and debentures. The debentures having been taken over by the Metropolitan Water Board, the shares remained to be disposed of; and this is done by sections 3 to 5 of the Act. Divested of verbiage they set forth that the money awarded by the Water Board as compensation is to be distributed proportionately. Any money payable by the Board in recoupment of expenditure by the Company in respect of the undertaking of the Staines Reservoirs Joint Committee is to be treated as profits available for distribution among the shareholders, as if the Act of 1902 had not been passed. As from Jan. 1, 1905, the Company will be empowered to register as a joint-stock undertaking; and the original Charter, as well as the subsequent Acts relating to the Company, will cease to be applicable. For the Charter there will be substituted the usual Memorandum and Articles of Association. The most interesting portion of the Act to the general reader is the preamble, which gives a history of this unique water undertaking; the bulk of the measure being devoted to the provisions for vesting the shares of the new Company in the present holders.

The City of Norwich Water-Works Act is solely to authorize the Norwich Water Company to raise additional capital. The amount sanctioned is £160,000, which is limited to 6 per cent. dividend on ordinary, and 5 per cent. on preference capital; and borrowing powers to the extent of one-fourth are granted. The new shares or stock are to be put up to auction or tender, and those not sold are to be offered to shareholders. The provisions of the Act with respect to the sale of shares or stock created under its authority, the application of the premiums arising therefrom, and the provisions incidental to such sale, are to apply, *mutatis mutandis*, to the granting of mortgages and the issue of debenture stock under the Act.

The Southend Water-Works Act is another measure to sanction the raising of more capital; the amount granted in this case being £184,000. The dividend is limited to 5 per cent., whether on ordinary or preference capital, unless a larger amount is declared on the former to make up any previous deficiency. The new capital is to be issued on the usual conditions; borrowing powers to the extent of one-fourth being granted.

The Ticehurst and District Water and Gas Act is to sanction the amalgamation of the undertakings of the Ticehurst and Robertsbridge Water Company, and the Wadhurst, Ticehurst, and District Gaslight and Coke Company, the extension of the limits of supply, the construction of new works, and the raising of additional capital. The general scope of the Act has already been noticed (*ante*, p. 96); and it only remains to mention here that the Company have power to construct new water-works, comprising a well and pumping-station in the parish of Ticehurst, a service reservoir in the parish of Burwash, and two conduits or pipe-lines, together with subsidiary works; and they are to be completed within five years from the passing of the Act. All streams, springs, and waters intercepted by the works may be impounded. Authority is given to hold lands for the protection of the works and water from pollution.

Manchester and District Junior Gas Association.—The sixth annual general meeting of this Association will be held on Saturday, the 29th inst., at the Mosley Hotel, Manchester. According to the circular issued by the Secretary (Mr. Fred Oldfield), the business will comprise the presentation of the report and accounts, the election of office-bearers for the ensuing year, and the President's address.

WITH THE MANCHESTER CORPORATION AT THEIR GAS-WORKS.

A visit which had an educational object was arranged by the Chairman (Alderman Robert Gibson, J.P.) and members of the Gas Committee of the Manchester Corporation for last Thursday. They invited the whole of the members of the Corporation, from the Lord Mayor (Mr. T. T. Shann) downwards, to accompany them on a visit of inspection to the three principal manufacturing stations of the Gas Department; and no less than eighty members were in a position to accept the invitation, so that in all there were, with the officials of the department, and the representatives of the Press, certainly 90 to 100 gentlemen in the company. The Manchester Corporation Gas Department know how to do these things; and how to win the respect, confidence, and good will of their fellow-members—excepting perhaps, is it only one or two (?) who are obstinately blind to conviction, and who will not see or believe that any good thing can come out of this Nazareth—if the term applied to a Gas Department can be forgiven. Alderman Gibson was in splendid form (and on reflection the writer has never met him when he has not been); and whether as marshal, spokesman on technical and financial matters, or (*entre nous*) as jester, he on Thursday filled every position with circumspection, grace, and strength. Good helpers, too, he had in his fellow-Committeemen, and in the various officials: Mr. Charles Nickson (Superintendent of the department), Mr. F. A. Price (Deputy-Superintendent), Mr. J. G. Newbigging (Chief Engineer), Mr. John Merrill (Manager of the Gaythorn station), Mr. J. S. Naylor (Manager of the Rochdale Road station), Mr. J. R. Hill (Manager of the Bradford Road station). Mr. A. Massey (Manager of the Droylsden station), and Mr. W. C. Waddington (Superintendent of Street Mains and Lighting). At the various stations, too, the Deputy Managers—Mr. F. Arnott (Gaythorn), Mr. G. W. Tooley (Rochdale Road), and Mr. J. Taylor (Bradford Road)—also rendered valuable assistance in giving information.

The Position and Financial History in Brief.

Before following the councillors in their inspection, a dip may be usefully made into an interesting *brochure* which had been prepared in order to acquaint them with the history and position generally of the vast undertaking in the fortunes of which they are all so intimately concerned. The works, the compiler tells us, were established in 1817 by the Police Commissioners, who were at that time the governing body of the town. On June 24, 1843, the powers and duties of the Commissioners were transferred to the Corporation; and from that date the gas-works became municipal property. The total capital outlay on the undertaking to March 31, 1904, after writing off depreciation, was (as shown by the last balance-sheet) £2,446,865. The outstanding mortgage debt in respect of this outlay was, at the date stated, £1,211,564. The financial results of the undertaking during the 61 years it has been municipal property may be gauged from the following figures: Gross profits (after duly providing for depreciation), £5,297,986. This immense sum has been appropriated in these various ways: Interest on loans, £1,230,565; redemption of loans, £1,195,833; applied in extension of works, £96,293; applied in aid of the rates or of other departments (Water-Works Department £166,265, Improvements Department £1,367,641, street lighting £329,202, city fund £766,193), £2,629,301; and contingent fund account, £145,994. These are truly remarkable figures.

The financial position of the Gas Department, as disclosed by the last balance-sheet, was as follows: Total value of works, property, and other assets £2,769,749; total liabilities (including the mortgage debt of £1,211,563), £1,340,052. Therefore, the excess of assets amounts to £1,429,697.

The price charged for gas in 1817 was 14s. per 1000 cubic feet; and at the time the undertaking was transferred to the Corporation in 1843, the price was 6s. per 1000 cubic feet. At the present time the prices are as follows: For general purposes within the city, 2s. 4d. per 1000 cubic feet; outside the city, 2s. 7d. For power purposes within the city, 2s. per 1000 cubic feet; outside the city, 2s. 3d. By prepayment meter within the city, 2s. 9d. per 1000 cubic feet, which is equal to 30 feet for a penny; outside the city, 3s. 4d., which is equal to 25 feet for a penny. Rent, it is mentioned, is not charged for meters or stoves. The output of gas in 1844 was 248 million feet; and in 1904 it reached 4994 millions—being an average annual increase of about 5¼ per cent.

The number of consumers on March 31 last was: Within the city 77,085 ordinary, 39,619 prepayment; outside the city, 25,031 ordinary, and 4722 prepayment—a total of 146,457.

The total quantity of coal, cannel, and oil used in 1904 was 458,864 tons, yielding 4,986,917,000 cubic feet of gas (which is equal to 10,868 cubic feet per ton), of an average illuminating power of 17·80 candles, tested by a flat-flame burner. The percentage of coal used was 58·62, of cannel 15·22, and of oil 26·16. The largest quantity of coal, cannel, and oil carbonized in 24 hours was 2200 tons. The total manufacturing capacity of all the works in 24 hours is: Coal gas, 18,900,000 cubic feet; carburetted water gas, 6,500,000 feet—a total of 25,400,000 feet. The total storage capacity of all the gasholders is 24,500,000 cubic feet; and the largest consumption in twenty-four hours has been 26,164,000 cubic feet (Dec. 27, 1899). The total number of men engaged in the general administration and management of the gas undertaking is 426; and the total number of employees, including administration staff, is 1954. The total revenue of the department from all sources last year was £743,963.

A statistical statement of considerable interest was supplied to the visitors by the Superintendent of the Department. It was prepared by his deputy (Mr. Price); and it gave all the principal figures relating to the finances and development of business, year by year since April 1, 1894—that is to say, for the last decennial period, which covers precisely the length of the chairmanship of Alderman Gibson—he having received the mark of the confidence of his colleagues which put him at the head of the administration of this magnificent undertaking on June 29, 1894. At the beginning of the decade, it is seen that the price of gas within the city was 2s. 6d. per 1000 cubic feet. It has been down to 2s. 3d.; and the highest it has been was 2s. 9d. during the period of high prices for material. The charge to-day is 2s. 4d. Outside the city, the price was 3s. ten years ago; it is now 2s. 7d. Meter-rents in the city were abolished in 1895, and outside the city three years later. The prepayment consumers have gained in their allowance per 1d. from 25 to 30 cubic feet in the city, and from 21 to 25 cubic feet outside. In September, 1902, a reduced price for power purposes came into force; the price being 2s. within the city and 2s. 3d. outside. On March 31 last, the number of ordinary consumers had reached 102,116 (an increase in the ten years of 21,308); and the prepayment consumers, 44,341 (an increase of 42,860). The total number of consumers was thus 146,457; being an enlargement of the figures of ten years ago by 64,168, notwithstanding the fact that these have been the years of considerable development in the Electricity Department. The number of cooking-stoves in use last March belonging to the department was 17,722, which is an extension by 14,343 in the decade. The annual figures show the remarkable effect of abolishing the hire for cooking-stoves both within and outside the city at June, 1903. In the twelve months ending March last, the number of cooking-stoves fixed jumped up from 12,803 to no less than 17,722. Companion figures to some of those given in the preceding paragraph are found in this tabulated statement. The reduction in price must be remembered, as well as the abolition in meter and stove rents, in considering that between 1895 and 1904, the income has risen from £579,277 to £743,963, and the gross profits from £134,697 to £183,685. Looked at in another way, an expenditure of £444,580 was incurred in 1894-5 to produce an income of £579,277; while last year an additional expenditure of £115,698 produced an extra £164,686—and this notwithstanding all the concessions to consumers in the meantime. If this means anything at all, it is that a great economy in working, considerably beyond what is represented by the bare figures, has been achieved. Then after meeting interest and sinking fund, the net profit amounted last year to £93,841, against £90,438 ten years since. In all but two years in the decade, large sums exceeding £50,000 have been paid into the city fund in relief of the rates—last year the sum amounted to £70,000; this being many thousands in excess of any previous year. Curiously, 1894-5 was the next highest, with £54,044. In the last eight years, a total of £96,292 has also been applied to the extension of the works where borrowing powers were not granted. In every year, excepting four, considerable balances have been taken to the contingent fund; and the four exceptions only represent a sum of rather over £40,000. On the extension of the works and plant during the ten years, the total net outlay has been £889,227; and the amount charged against revenue in respect of renewals has been £291,103. The period is also noteworthy as having seen the introduction of carburetted water gas at the works, as well as the manufacture of sulphate of ammonia and sulphuric acid.

The Position and Development of the Works.

In the foregoing paragraphs, we have shown with clearness the great upward changes which have come over the business of the Manchester Corporation Gas Department—financial, economic, quantitative. They supply one picture; and it must necessarily have its companion in the changes and growth at the works. The decade has been, and more so its latter than its former half, one that has been marked by extensive alterations and additions at the several works of the Corporation, with the object of modernizing them, equalizing their capacity to a point well ahead of the demands, and enabling the manufacture of gas to be carried out in the most economical manner. After the inspection of the works and remarking the newness in character of much of the plant, the amount of displacement and renewal that has taken place since last the writer had the pleasure of visiting the works, the quantity of work still in hand, and the schemes already projected for consummation as soon as opportunity favours, no words are needed to inform one that since his appointment as Chief Engineer in January, 1900, Mr. J. Gibson Newbigging has had an extremely active time. Half-a-dozen figures will show the extended requirements made on the works in the ten years. The coal carbonized in 1894-5 was 364,895 tons; and in the past year 458,864 tons, which is an increase of 93,969 tons. The output of gas in 1894-5 was 3683 million cubic feet; in 1904, 4994 millions—being an increase of 1311 millions. This is an addition of considerably more than one-third to the output of 1894-5.

FIG. 1.—COKE-STORING PLANT AT THE GAYTHORN STATION.
(The Coke-Hopper that is being raised to the Coke Stage-Floor has been fed by the Conveyor bringing the Coke from the First Inclined Retort-House.)

From the City Hall, the numerous party of the civic governors proceeded at two o'clock on Thursday on their tour of inspection. For the purpose, the services of a pair of the city tramcars were requisitioned; and the time-table which had been prepared had to be faithfully adhered to, in order not to interfere with the ordinary traffic. Rather less than a quarter-of-an-hour's ride brought the company to

THE GAYTHORN STATION.

At these works much of interest was seen; one of the central features being the inclined retort-house (erected by the late Mr. G. Ernest Stevenson) with which Mr. Newbigging has had such experience that his favour is now decidedly bent in that direction. An interesting point is brought to notice here. It is that the original site of these works which was acquired in 1837 was at one time the property of the Provincial Portable Gas Company. The site, however, now extends over some 8 acres 4456 square yards; and on it the output of gas is about 4½ million cubic feet per day. The extensive character of the reconstruction work that has been carried out at this station, and is still in progress, cannot fail to be observed by the visitor.

Reverting to the inclined retort-house, which was erected in 1898, it is found to contain eighteen settings of six 20-feet retorts; so that there are altogether 108 retorts in the house, with a total

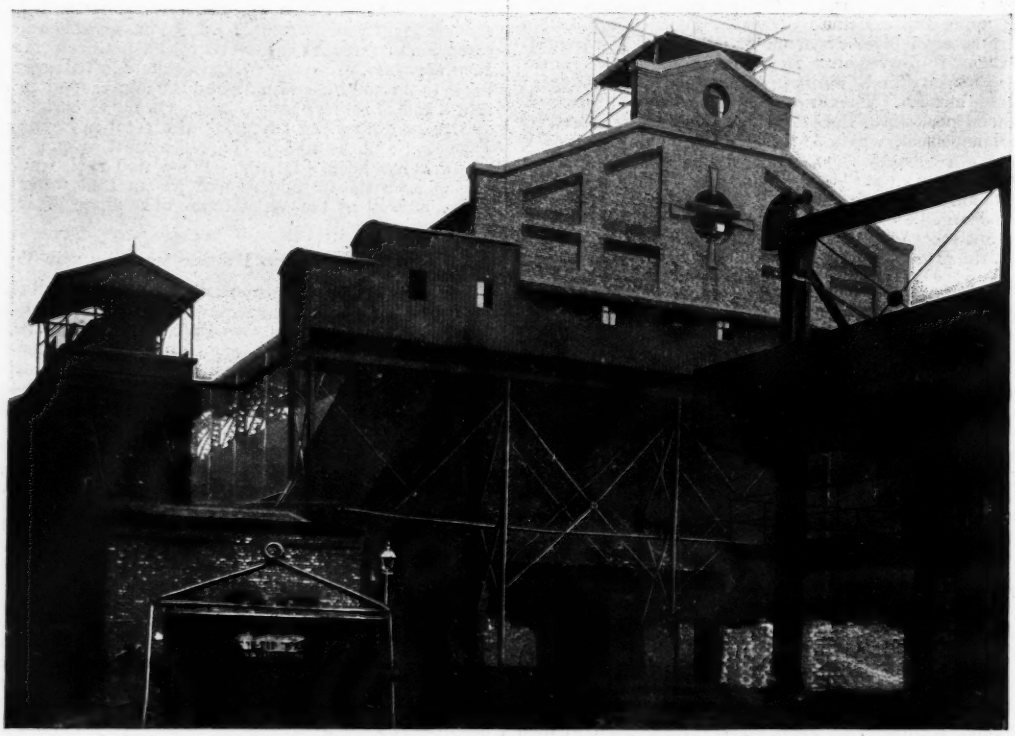


FIG. 2.—THE SECOND INCLINED RETORT-HOUSE AT THE GAYTHORN STATION.
(In course of erection.)

productive capacity of 1½ million cubic feet of gas (fig. 1). The retorts which were seen in use had been working about 600 days, and were yielding an average of 11,400 cubic feet to the ton. The party watched the charging and discharging of the retorts; and then it was pointed out to them that the successful working of the house has been such that the Gas Committee, on the recommendation of the Engineer, have decided to further extend the system—in fact, at this station the whole of the carbonizing plant will eventually be on the inclined system. A retort-house, of a capacity of 3 million cubic feet a day—containing horizontal retorts partly worked by hydraulic stoking machinery, and partly by hand stoking—is being replaced by an inclined retort-house of a capacity of 4½ million cubic feet a day (fig. 2). The first half section was seen in course of erection; and this will be completed and ready for work for the winter of next year. The new building is a substantial one, and is being constructed partly over the river. The roof principals are semi-circular in form, and are being supported on heavy uprights carried right away from the floor. The foundation stone of the settings was laid last Friday. The old horizontal house formerly contained 41 settings of through retorts of ordinary type, six retorts in a setting, worked by Woodward's hydraulic machinery. It may be noted here that the ultimate producing capacity of the Gaythorn works will be 6 million cubic feet a day.

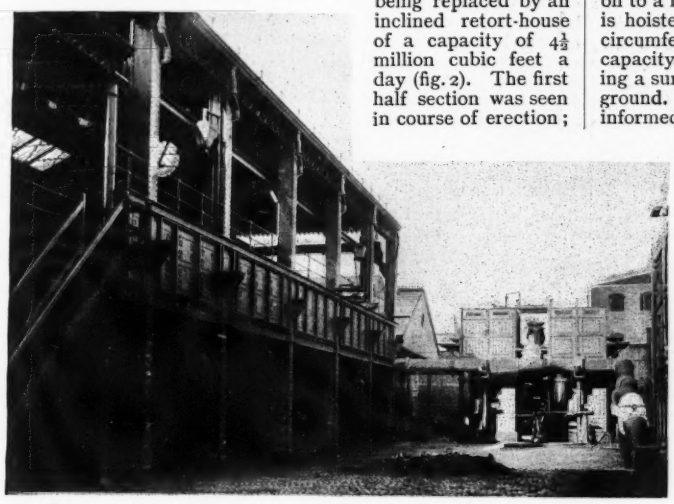


Fig. 3.—New Condensers and Purifying Plant at the Rochdale Road Station.

A few words now as to the system of dealing with the coal and coke in connection with the already existing inclined retort-house. The coal is transmitted to the retorts entirely by mechanical means. The railway trucks are emptied over a shoot into a large hopper, provided at the bottom with a coal-breaking machine. The coal is elevated to a conveyor 46 feet above the ground-level, and is transported by it to the retort-house, and on to the overhead bunkers. The coke is removed from the house by a West conveyor, which discharges at one end of the house into waggons having a capacity of 1 ton each. These are hoisted and tipped on a substantial outside stage-floor, capable of storing 500 tons (fig. 1). In this floor, there are twelve outlets for loading the coke into carts; and connected with these outlets are screens over which the coke passes as it falls into the carts—the breeze dropping on to a lower stage about 12 feet from the floor-line. The coke is hoisted on to the stage by a crane, which travels round the circumference of the apparatus. In addition to the storage capacity of 500 tons on the stage, the crane is capable of covering a surrounding area sufficient to store about 2000 tons on the ground. The coke plant is Woodward's patent; and the writer was informed that it deals with the coke in so efficient a manner that the proportion of breeze made is only about 5 per cent. Mr. Newbigging is not a strong advocate of coke-conveyors, partly on account of his experience as to the relative percentage of breeze formed by conveyors and the system of trolley-waggons. In the second inclined house, he proposes to receive the coke into the trolleys direct, instead of multiplying the operations by transporting it from the retort-house by a conveyor, and then passing it down slides into the trolleys. The trolleys in the case of the second house will be dealt with by the crane and carried to the stage coke-floor as in the present system; and this will in all probability necessitate the extension of that floor. There is another noteworthy point about this coke-stage. At one side there is a range of four overhead coke-hoppers, holding about 150 tons. The Gas Committee have at these works a large local demand for coke in small quantities among the poor people of the neighbourhood, and on some days they sell here as many as 3500 to 4000 separate hundredweights or half-hundredweights of coke. They at times get a long string of these poor people waiting to be served. The hoppers are for the purpose of meeting this demand. The bottoms are of conical form; and at the bottom of each there is a slide door, operated by a hand lever. Beneath each outlet, there are supported on a pillar four revolving measures, each holding ¼ cwt.; and by these means, the hand trucks, barrows, or sacks of the purchasers are expeditiously filled.

It was also noted that the condensing plant at this station consists of one large rectangular horizontal condenser 107 ft. long by 22 ft. wide by 15 ft. deep, and a series of 24-inch water-cooled pipes. A set of nine scrubbers, 32 feet high by 10 feet diameter, are also utilized as atmospheric condensers. Regarding the exhausting plant, there are four sets of twin rotary exhausters, with engines combined—two of the sets are by Messrs. Bryan Donkin

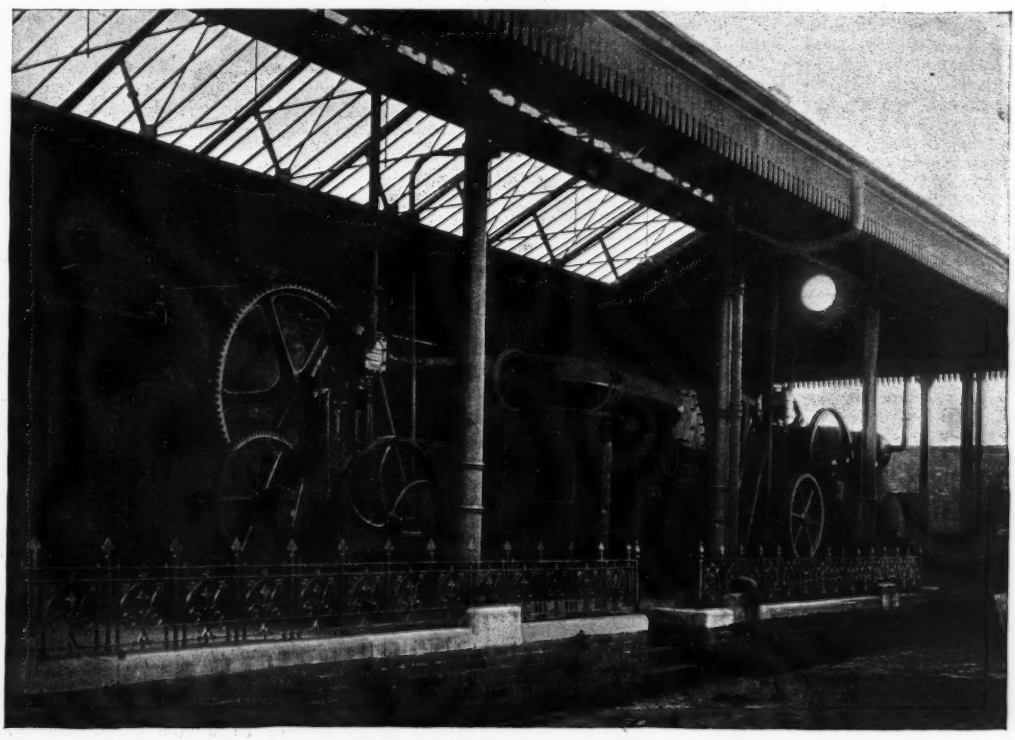


Fig. 4.—Washing and Scrubbing Plant at the Rochdale Road Station.

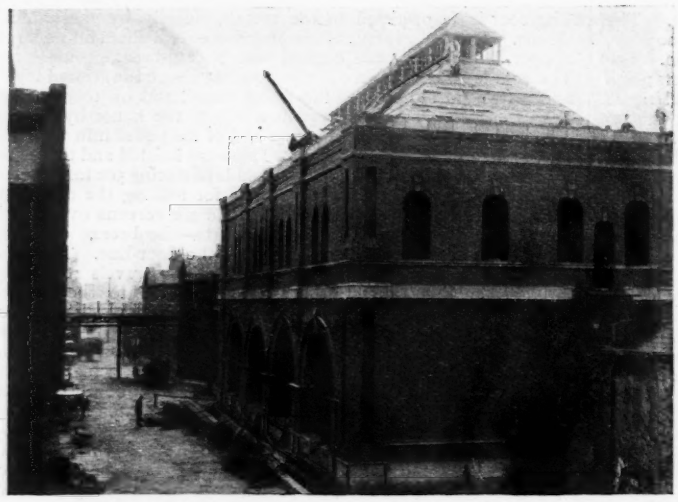


Fig. 5.—The New Exhauster-House, Workmen's Dining-Rooms, and Lavatories at the Rochdale Road Station.

and Clench, of a capacity of 100,000 cubic feet an hour each; one set by Messrs. R. Laidlaw and Son, of a capacity of 160,000 cubic feet an hour; and one set of a capacity of 150,000 cubic feet per hour, by Messrs. George Waller and Son. The washing and scrubbing plant comprises a Livesey washer, Stevenson extractor tower, and Holmes rotary washer-scrubber. There are three sets of purifiers, comprising altogether 24 boxes, with a total area of 15,000 square feet. Three station meters have a capacity of 100,000 cubic feet an hour each. The boilers at this station, which were formerly scattered about various parts of the works, have been concentrated in one building. A new mechanics' shop has been provided in proximity to the retort-houses, and it has been fitted with the latest machinery for dealing with repairs to the plant. At this station, there are seven three-lift gasholders of from 100 to 150 feet diameter, of which three have the top lift guided by wire ropes. The total storage capacity is 6 million cubic feet. The leading mains proceeding from these works are one 36-inch, one 30-inch, seven 24-inch, and one 18-inch. There is also an independent 36-inch main, communicating with the Bradford Road works, with an exhauster for pumping gas from that station.

Rochdale Road Station.

The councillors having exhausted the prominent objects of interest at Gaythorn, again boarded the tramcars; and well within half-an-hour, they were at the Rochdale Road station, around which dwell the melancholy memories of the deplorable explosion through which the former Engineer lost his life.

When Mr. Newbigging was appointed Chief Engineer in 1900, one of the first duties he was called upon to perform was the preparation of a report on the reconstruction and reorganization of these works. His recommendations and scheme were adopted by the Gas Committee; and the work is now being carried out. It is apparent that the process of reconstruction must have been beset with great difficulties, owing to the congested state of the station. But, happily, so far it has been carried on without accident; and it is hoped that three years hence will see the completion of the scheme.

The work already finished, the visitors were informed, comprises the removal of existing condensers to another site on the works, and the provision of additional condensing power (fig. 3); concentration of the washing and the scrubbing plant under one roof, and adjoining the purifiers (fig. 4); a handsome new exhauster and power house of two storeys, to contain three twin sets of exhausters, each set having a capacity of 150,000 cubic feet per hour, and power for the stoking machinery, on the ground floor, with, on the upper floor, an extensive dining-room and lavatories for the use of the men (fig. 5). Formerly there were four retort-houses at this station. One of them, however, has been subdivided into three parts, and converted into fine, light workshops for the mechanics and blacksmiths, and a station-meter house. A new joiners' shop and offices for the foremen of the several departments have also been provided. The whole of this work has had to be carried out without interfering with the manufacture of gas at the station. The work still remaining to be done is the erection of a boiler-house and boilers, new stores, elevated railway, and also additional coke yard and coke storage hoppers. The site of the station covers 9 acres 339 square yards; and on the completion of the scheme, the works will be capable of manufacturing, with efficiency and economy, 6½ million cubic feet of gas a day.

Of the remaining retort-houses, two contain each 18 settings of horizontal oval through retorts, 20 feet long, and nine in a bed; and the third house 19 settings, with eight retorts in each. All the settings are of recent construction, and are heated by regenerator furnaces; their total productive capacity being 6 million cubic feet per day. In the first two houses, it is seen that hydraulic stoking machinery of the Woodward-Foulis type is in use, and in the third one Woodward machines, actuated by gas-engines. In this connection, it was learned that more up-to-date machinery will be adopted when the reconstruction is completed. However, the working of the present machines was watched with much interest, though, judging from the conversation, it did not strike many of the uninitiated councillors that they contained the element of simplicity which belongs to the inclined retort-house installation seen at Gaythorn.

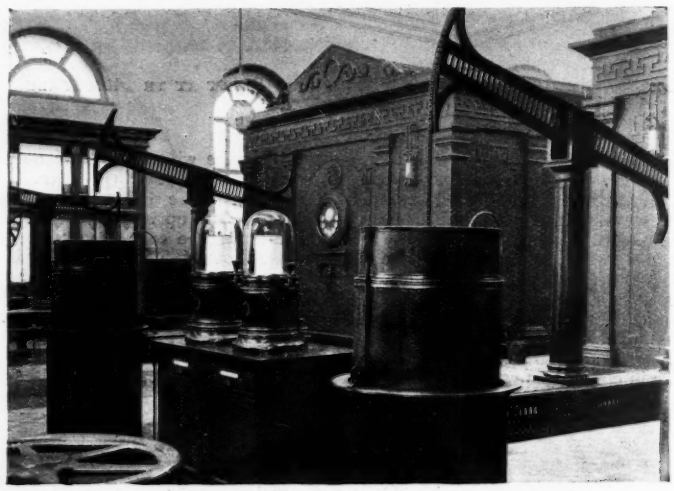


Fig. 6.—Meter and Governor House at the Rochdale Road Station.

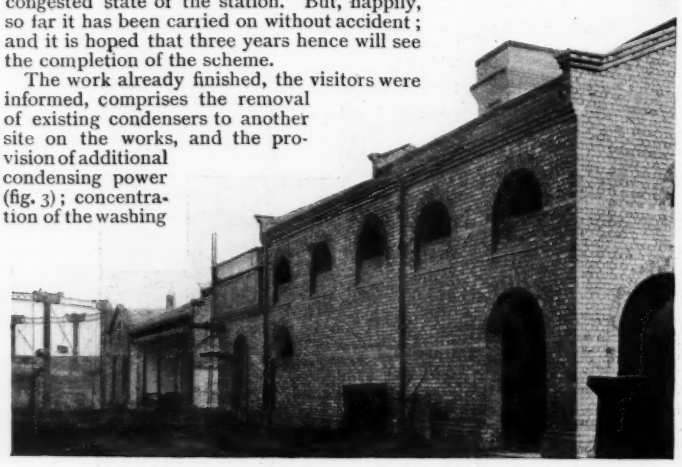


Fig. 7.—Experimental Gas-Works at the Bradford Road Station.

Running round the other portions of the works, it is remarked that the condensing plant consists of one large rectangular horizontal condenser, 225 ft. long by 22 ft. wide by 15 ft. deep; one "Eclipse" water-tube condenser of four batteries; and one condenser, erected by Messrs. Ashmore, Benson, Pease, and Co., of two batteries. The exhausting plant is of the Anderson type. In all there are five exhausters, with engine attached, each of a capacity of 70,000 cubic feet an hour. As to the scrubbing and washing plant, there are three sets of washer-scrubbers, preceded by three Livesey washers for 4 million cubic feet each. The gas is divided into three streams, one passing through each set. The purifying plant comprises one set of eight purifiers, each 32 feet square; a set of four, 50 ft. by 30 ft.; and one set of four, 45 ft. by 39 ft. 6 in.—the total area being 21,302 square feet. In the new meter-house, two meters (each of a capacity of 175,000 cubic feet an hour) have been substituted for the former small meters (fig. 6). The storage capacity at this station is 4,100,000 cubic feet, and comprises five three-lift gasholders of from 90 to 150 feet diameter. Two of the holders are situated at the Newtown gasholder station, about a ¼ mile distant. The leading mains

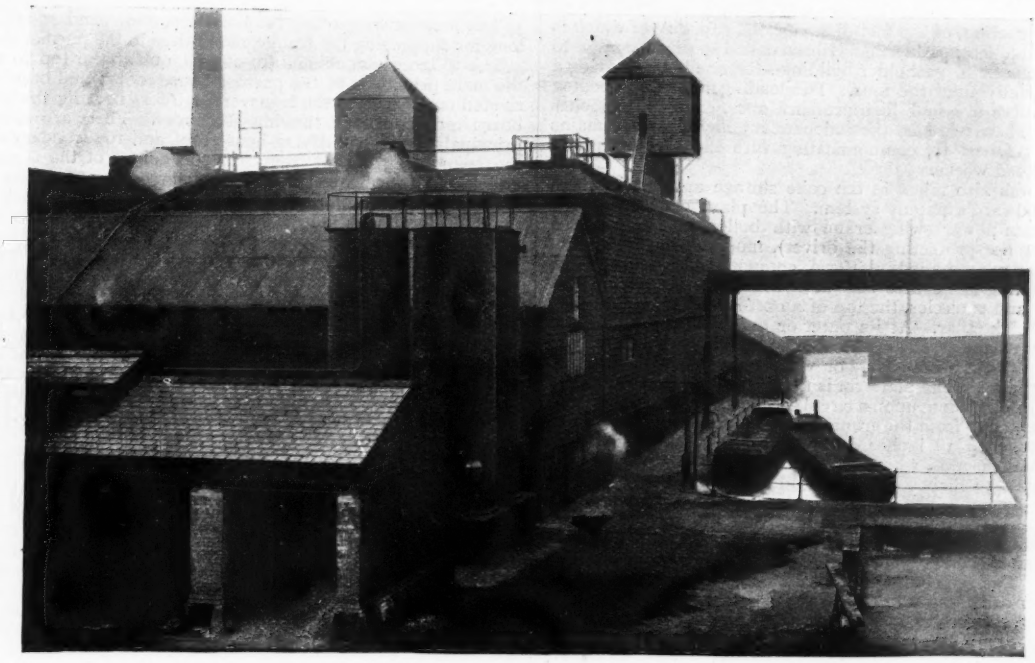


FIG. 8.—CHEMICAL WORKS AT THE BRADFORD ROAD STATION.

proceeding from these works are four 24-inch, and from the Newtown gasholder station one 30-inch and two 24-inch. There is also a 30-inch independent main communicating with the large gasholder at the Bradford Road works.

Completing their inspection at Rochdale Road, the company were next taken to the

BRADFORD ROAD STATION.

There they were on the principal gas-works of the Corporation; the area occupied being some 53 acres 797 square yards. By the way (this was a point gathered in conversation) if the land owned by the Gas Department were sold, it would alone realize a considerable proportion of the existing debt of the Corporation. Some 14½ million cubic feet of gas is the productive capacity of these works, of which 8 million cubic feet is coal gas, and 6½ millions carburetted water gas. It is at this station, Mr. Newbigging mentioned, that the future manufacturing extensions will be made; and there is plenty of vacant ground for them. The works are even now connected up with the Gaythorn and Rochdale Road works with 36-inch and 30-inch independent mains respectively; so that carburetted water gas can be supplied to those stations for enriching their production of coal gas.

It was seen that there is nothing very special about the coal gas portion of the works; and therefore the briefest summary of the component parts will suffice, with extension of description where interest suggests it. Starting with the two large retort-houses, they each contain 28 regenerative settings, with eight or nine horizontal retorts in each; the total producing capacity being, as already stated, about 8 million cubic feet. Both houses are provided with West's compressed-air stoking machines. Some little time was spent by the visitors in watching their operation. The coke is removed here by trolleys filled through shoots in the stage-floor. Taking the other plant in order, it was noticed that there are three Morris and Cutler water-tube condensers, and one of the "Eclipse" type, with vertical columns. Of twin rotary exhausters, there are two sets, with engines combined, by Messrs. Gwynne and Co., each being capable of passing 280,000 cubic feet of gas an hour; and two sets of twin exhausters and engines, by Messrs. Laidlaw and Son, of 240,000 cubic feet an hour capacity. Regarding the scrubbing and washing plant, four Livesey washers are used, each of a capacity of 2½ million cubic feet per day; two of Kirkham, Hulett, and Chandler's rotary "Standard" washer-scrubbers, of 2½ million cubic feet capacity; and one Clapham and Laycock's washer-scrubber for 3 million cubic feet. For the purification of the coal gas, there are 22 purifiers, situated in a shed 410 feet long. A wing, 165 feet long, has also been built with eight additional purifiers. The total area of the coal-gas purifiers is 27,000 square feet. In all, there are five station meters—four of a capacity of 175,000 cubic feet an hour, and one of a capacity of 160,000 cubic feet an hour. Three of the meters are used for registering the coal gas manufactured; and two for the carburetted water gas. The meter-house is on the gasholder site, which is separated from the manufacturing part of the works by the railway. The gas storage is equal to 13,800,000 cubic feet, being supplied by four three-lift holders of 150 feet diameter (grouped close together, and having their nearest columns braced, so that the four have external connection one with the other), having a combined capacity of 6,800,000 cubic feet; and one of

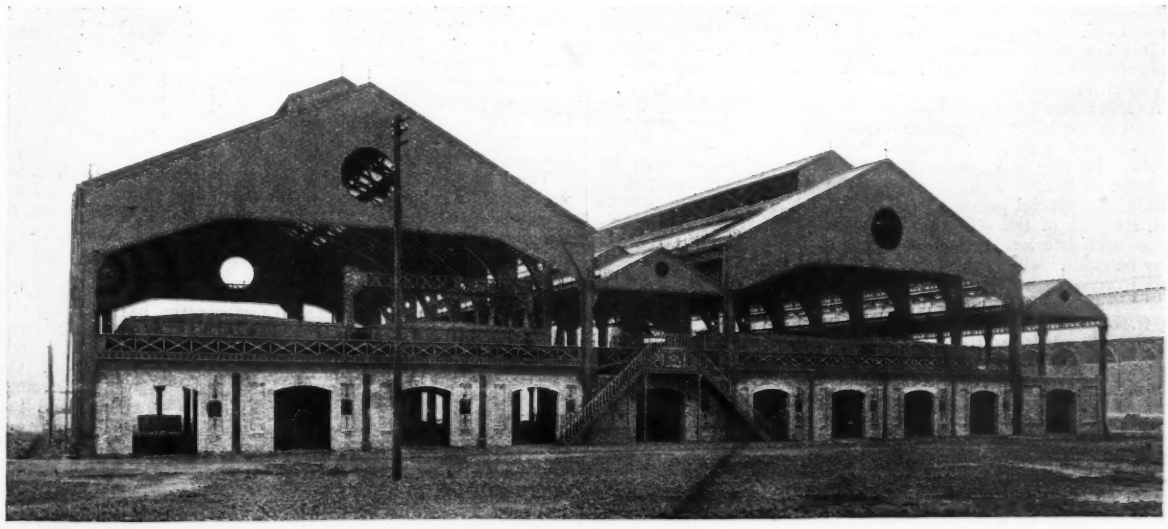


FIG. 9.—THE NEW PURIFYING-HOUSE AT THE BRADFORD ROAD STATION.

recent construction, of 250 feet diameter, the capacity of which is 7,000,000 cubic feet. Alderman Gibson called special attention to this development in gasholder building—the one holder having a greater capacity than the four. The leading mains proceeding from the works are four high-pressure ones, each of 30 inches diameter. There are also the independent high-pressure mains previously referred to, communicating with the Gaythorn and Rochdale Road works.

Interest was also taken in the coke storage apparatus, which is on Woodward's patent system. The plant consists of one 30-cwt. steam-power swing crane with boiler, and corrugated iron housing (for protecting the driver), mounted on the end of a long triangular-shaped platform composed of wrought-iron girders, meeting in a centre boss at their inner ends, which boss rests upon, and encircles, the top of a cast-iron column bolted to a massive brick pillar. At its outer or crane ends, the platform or crane-carriage spreads out to about 14 feet wide; and it there rests upon two cast-iron rollers or wheels worked by power from the crane engine. The platform is thus caused to rotate around the centre brick column upon a circular roadway 110 feet diameter, raised 20 feet high from the ground, and composed of twenty cast-iron girders, each 18 inches deep, and 17 ft. 3 in. long, bolted together at their ends, where they are supported by twenty cast-iron columns, 10 inches diameter and 18 ft. 6 in. long, bolted to foundation-stones. The apparatus is capable of dealing with 200 tons in 24 hours, hoisting 1 ton each lift, and conveying, tipping, and piling the coke 44 feet high, in the form of a conical ring of about 200 feet diameter at the base, and containing about 7000 tons. The only labour required is one man at the crane, and another attaching and detaching the tipping buckets to the crane chain.

A few spare minutes were found here for an examination of the experimental gas-works (fig. 7) which have been erected for testing coal and for general research work—the plant being complete in every detail from retorts to governor. The capacity is 60,000 cubic feet per day; but the plant has been so arranged that it can be increased to double that capacity at very little additional cost. It is kept constantly running.

The chemical works of the Gas Department are also situated at this station (fig. 8). The sulphate of ammonia plant is in duplicate, and has a total capacity of 40 tons per day. The ammoniacal liquor produced at the four works is dealt with here. The Department also manufacture their own sulphuric acid; the plant having a capacity of 80 tons a week. The acid is produced from the spent oxide yielded by the several works, and the sulphuretted hydrogen gases generated in the sulphate plant. The Chemist (Mr. Holton) greatly interested the visitors with explanations.

The Carburetted Water-Gas Plant—A Large New Purifying-House.

Turning to the inspection of the carburetted water-gas plant at the Bradford Road station, it is found to consist of eight sets of Humphreys and Glasgow's construction, and of a total capacity of 6½ million cubic feet per day. Four sets only were at work on Thursday; and the production was about 4 million cubic feet. The plant also comprises six Lancashire boilers, four blowing-engines and fans, two exhausters with engines of Messrs. R. & J. Dempster's make, and the necessary pumps, oil-meters, separating and settling tanks, &c. A relief gasholder 80 feet diameter, and two oil-tanks are situated a short distance from the building. The capacities of the oil-tanks are: No. 1, 301,218 gallons; No. 2, 301,397 gallons—total, 602,615 gallons.

A new purifying-house and lime-sheds have been erected by Clapham Bros., Limited, for purifying the carburetted water gas (fig. 9). This structure, which is entirely of steel, covers an area of 4444 square yards, and contains twelve purifiers, each 35 feet square, with space for an additional four purifiers. The total area of the twelve purifiers is 14,700 square feet. The boxes are built on a stage-floor, with sufficient head-room for railway waggons to run underneath, to deliver the fresh lime and remove the spent material.

As this house (of which both the designer and contractors are proud) is the latest of the new work at the station, we may specially describe it in greater detail than the older portions of the works. In the first place, it should be mentioned that, on account of the treacherous state of the site and the atmospheric conditions, special provision had to be made in the foundations and strength of the structure, in order to resist possible subsidence and deterioration. Some idea of the extent of the work may be gained when it is stated that upwards of 2490 tons of steel and iron were used in it. There are in reality two purifying-houses, each 90 ft. wide by 160 ft. long, and two lime-stores, each 35 ft. by 160 ft.; one of the latter being placed between the purifying-houses, and the other along one side, while provision is left for a third on the remaining side. The height of the purifying-houses to the apex is 74 feet, and to the eaves 43 feet; and that of the lime-stores, 44 feet and 32 feet respectively. The photograph gives a general idea of the nature of the work and the disposition of the houses. Both houses and stores are built of steel. The number of stanchions supporting the roof and the purifier staging is 90, 36 of which are formed of three rolled H-girders, 18 in. by 7 in., riveted together by plates, and forming a square column 21 in. by 26½ in. by 35 ft. long, and 54 formed of two rolled H-girders, 15 in. by 6 in., riveted together by plates, and forming a column 16½ in. by 14 in. Nine of these stanchions are 32 feet long for supporting the lime-store roofs, and 45 are 16 feet long for supporting the transverse girders to the purifier-floors.

The 36 large stanchions are curved out at the top to receive the main principals of the purifier-house roofs; and brackets are riveted on to receive the transverse girders bearing the purifier-boxes and one side of the lime-store roof. There are nine main principals for each purifying-house roof, and 16 secondary rafters; the span being 90 feet from centre to centre of the stanchions, and the distance apart 6 ft. 8 in. from centre to centre. The main principals are curved on the underside, and are built up in trellis form with diagonal braces and struts. A longitudinal lattice girder, 24 in. deep by 12 in. in width, is fixed between the principals at the eaves of the main roofs, to which girder is secured the lower portion of the secondary rafters. The principals are braced together diagonally between the top of the main stanchions and the lattice girders. Four lattice girders, 24 in. deep by 12 in. wide, are fixed between the main principals for supporting the secondary rafters and for stiffening up the structure. Each roof is provided with ventilators. At the top of the stanchions for supporting the lime-store roof is fixed a lattice girder, to which are attached the rafters of the roof. The two lime-store roofs consist of 50 principals of 33 ft. 9 in. span from centre to centre of the girders upholding the roof, supported on one side by the above-mentioned lattice girder, and on the other by 9 in. by 7 in. rolled steel girders, with ½-inch flange plates top and bottom secured to the larger stanchions. In the main roofs, the angle-steel purlin bars, 1¾ in. by 1¾ in. by ¼ in., are bolted to all bearing parts, and wood purlins, 2¼ in. by 2¼in., are securely fixed to them. The lime-store roofs are treated in a similar manner with sections suitable to the reduced span. Four stretches of Clapham's cast-iron skylight framing 11 feet deep are fixed, and glazed with ¼-inch rolled plate glass. The roofs are covered with Duchess slates, and the ridges are mounted with coloured ornamental lap-jointed tiles and ornamental finials. The gables of each roof and the ventilators are filled in with wooden framing and boarding V jointed; the lower edge being vandyked.

The staging to carry the purifier-boxes is composed of built transverse girders 24 inches deep, supported by the previously mentioned side and centre stanchions, upon which are fixed 14 in. by 6 in. rolled steel joists. Between the main stanchions for supporting the ends of the boarding forming the stage-floor, girders 10 in. by 5 in. are fixed; the opposite end resting upon flanges cast on the purifier-boxes.

Among general features of the structure, it is noted that wooden flooring, composed of 3-inch red deal planks, is laid round the purifiers and across two foot-bridges, which connect the main buildings. A cast-iron ornamental facia is fixed at the end of each house along the floor-bearing girders; and cast-iron standards and wrought-iron railing are carried round the whole flooring, giving a neat and complete finish to the work. The stage-floor is approached from one end of the building by a substantial and neatly designed two-way staircase built of steel and cast iron, the centre panel of which bears the Corporation coat-of-arms.

On the stage-flooring (which is about 17 feet above the ground-level) are six boxes, each 70 ft. long by 35 ft. wide by 5 ft. 6 in. deep, of the water-lute form, divided by partition and double-lute plates, making twelve purifiers, each 35 feet square. The lutes of the side plates are 3 ft. deep by 9 in. wide, and are moulded on top and panelled; the whole being of a neat and substantial character. Four of the boxes (or eight purifiers) are in one house, and are to be used for lime purification; and in the other house (half of which only is floored at present) are the remaining two boxes (or four purifiers), which are intended for oxide. A gangway about 5 feet wide lies midway between the boxes both transversely and longitudinally, also along their ends and sides. The boxes are complete with the usual cast-iron standards and 4 in. by 4 in. by ½ in. T steel bearing-bars, and 44,100 superficial feet of wood grids.

The twelve purifier-covers are of curved form, well trussed, framed, tied, and braced together, and weigh above 19 tons each. To raise these, there are four goliaths worked by hydraulic pressure; each being built to lift and carry to any required position at least 25 tons. The goliaths travel on steel rails securely bolted through 9 in. by 3 in. oak planking to longitudinal girders, fixed to the transverse girders supporting the purifiers.

The height from the ground-floor to the underside of the transverse girders supporting the purifiers is sufficient to allow railway waggons to pass underneath, clear of all pipe connections, &c. From each purifier, there are four discharge shoots, through which the spent lime or oxide may be discharged direct from the boxes into the railway waggons.

For supplying purifying material to the boxes, there are four lime and two oxide elevators, 36 feet centres, having a capacity of 15 tons per hour. The frames, which are of the lattice girder type and substantially constructed, are fitted with internal guides for the bucket skidder-bars, and entirely cased with wood. One side consists of a series of hinged doors, and is entirely removable—thus giving free access to the interior. The boot and hood fittings are of the makers' standard design; the former being constructed with cast-iron sides, steel bottoms, and adjustable tension gear, having heavy gun-metal bearings for the bottom shaft. The heads are formed of steel plates and channels bolted to the main roof principals by cast-iron brackets. They are fitted with cast-iron mouthpieces discharging into semi-octagonal wood shoots lined with galvanized steel, which deliver the purifying

material direct into the boxes. The elevators are driven by belt-and-spur gear from the line shafts; the pulleys on the latter being mounted on friction couplings, which are operated by hand-wheels on the stage close to their respective elevators. The line-shafts are 3 in. and 2⅞ in. diameter respectively, and have protected flange couplings. They run in heavy gun-metal plummer blocks carried on cast-iron sole plates over the main girders at the ends of the house, and by means of double-legged hangers and 5 in. by 5 in. joists on the sides. All bearings throughout the plant are fitted with gun-metal Stauffer lubricators screwed into the bushes—thus ensuring a positive supply of lubricant.

The plant is driven by two "National" gas-engines, each of 20 brake horse power, driving short shafts, which in turn are connected with the line-shafts by a pair of friction clutches. By this means, the shafts on the sides of the purifier-house may be driven independently; and the engines may be started without any load—the trouble in starting being thus reduced to a minimum.

The purifiers are worked with three of Clapham's patent "Eclipse" hydraulic centre-valves, with 24-inch diameter steel connections. Each valve controls four boxes, and will work either one, two, three, or four purifiers in rotation as required. The arrangement for supplying water to, and for emptying the various chambers, consists of two small patent special valves to each purifier, and an automatic water supply. The apparatus is easily worked, and under full control. To alter a purifier to "on," "off," or place it "intermediate," simply requires the setting of a small pointer on the dial of the two special valves. Of good workmanship, these houses are a splendid example.

This completed the inspection of the gas-works, but it did not exhaust all that is of interest connected with the gas undertaking. It will round off the story of the position of the Gas Department if information is included here as to those parts of the works which the councillors did not visit.

The Droylsden Works.

These are the small works purchased in 1869 from the Droylsden Gas Company; and they occupy a site with an area of 4 acres 3789 square yards. The retort-house is on the inclined system, and contains five settings of sixes. The retorts are 15 feet long; and it is interesting to remark that the settings have been in use for twelve years. The manufacturing capacity is 400,000 cubic feet per day. The works, it will be seen, are altogether on a comparatively small scale. A pipe condenser is situated in a water-tank over the exhauster-house, in which are two sets of combined engines and rotary exhausters by Messrs. Laidlaw and Son. The capacity of each of these is 15,000 cubic feet per hour. The washing and scrubbing is performed in two washers and one tower scrubber, 6 feet diameter by 40 feet high, made by Messrs. C. & W. Walker, with one of Messrs. Kirkham, Hulett, and Chandler's "Standard" washer-scrubbers for 500,000 cubic feet. One set of four purifiers, each 14 feet square, suffice; while the two station meters are each of 10,000 cubic feet an hour capacity. One double-lift holder, 60 feet diameter, and a three-lift Gadd and Mason holder, of 100 feet diameter, furnish a storage capacity of 600,000 cubic feet. These works supply the township of Droylsden, which is about 4 miles from Manchester.

[The photographs which we give indicate some of the work that has been carried out at the several stations since the appointment of Mr. Newbigging as Chief Engineer, and under his direction.]

The Distribution System and Depôts.

In order to make this account of the Manchester Corporation Gas Department complete, some information must be included concerning the distribution system, and the working arrangements associated with it. The distribution system is something that cannot be seen, and so is not frequently heard about; and visits of inspection by members of the Corporation cannot be paid to it. But the statistics which have been furnished are eloquent in testimony to as much attention being bestowed on the works and business of the outside department as on all that is comprehended in what are termed manufacturing operations.

Within recent times a depôt for the distributing department has been erected at Poland Street. The building is three storeys high—the basement being utilized for the storage of service-pipes and fittings; the second floor for the manufacture and repair of street-lamps; and the third floor for the cleaning and repairing of cooking-stoves and meters. A spacious yard adjoins this building in which main pipes are stored.

The Gas Committee have decided to erect a further building in Whitworth Street of three stories high, for cleaning, repairing, and storing the meters, as more space is required at Poland Street for dealing with stoves. It is interesting to learn that since the abolition of stove hire, the demand for cooking-stoves has enormously increased. Space will also be provided for work in connection with incandescent street lighting. The Gas Committee are contemplating adopting the system of maintaining consumers' incandescent burners; and, for dealing with this, space will also be provided in this building.

Now for a few particulars which will assist to a better understanding of the extent of the outdoor department. Excepting the large independent mains already mentioned, by which there is intercommunication between Gaythorn, Rochdale Road, and Bradford Road stations, there are 843 miles of main-pipes laid in the streets, varying in diameter from 36 inches to 2 inches. No better evidence is wanted regarding the soundness of this system, than the simple statement that the quantity of gas sent out last year, and accounted for, was 96·29 per cent. of the total output; the loss by leakage and condensation being therefore only 3·71 per cent. Altogether there are 146,457 meters in use, of which 102,116 are ordinary ones and 44,341 prepayment. Of the total, 142,441, or 97·26 per cent., are the property of the Corporation. The Gas Committee commenced to hire out meters in 1861; and the charge for hire was abolished within the city from March 31, 1895, and outside the city from Sept. 30, 1898. Prepayment meters were first introduced in 1891. In connection with the distribution system, the show-rooms in Deansgate should not be refused mention. They were opened in 1895; and there are now 17,722 stoves fixed. The Gas Committee commenced to hire out stoves in 1885; and the charge for hire was abolished in 1903.

Ship Canal Wharf.

It may not be generally known that the Corporation have a wharf on the Ship Canal, which wharf was constructed to enable vessels bringing oil for the manufacture of carburetted water gas to discharge their cargoes direct into the storage tanks of the Corporation. It is, of course, also available for other purposes in connection with the Gas Department. Two tanks (each 60 feet by 30 feet) have been erected; the capacities of these being respectively 493,587, and 493,463 gallons—together 987,050 gallons.

Dinner at the Town Hall.

It is eleven years now since the Council made a general inspection of their gas-works; and therefore on their return from the Bradford Road station, the Chairman and members of the Gas Committee celebrated the occasion by entertaining their guests at dinner in the Lord Mayor's dining-hall. There were several toasts appropriate to the occasion. Among them, the Lord Mayor proposed "The Health of the Chairman of the Gas Committee"—mentioning that Alderman Gibson was elected to the Council in 1882, and to the chairmanship of the Gas Committee in 1894. Since that time, they had known the Chairman as a man of energy and pluck, and full of good work.

In his reply, Alderman Gibson said he should be something less than human if he did not feel somewhat touched at the eulogistic manner in which the Lord Mayor had referred to his services. In subsequent remarks, he said he would confine himself to the policy of the Committee, the guiding principle of which had been to do the best they could for the consumers, without sacrificing the efficiency and prosperity of the gas undertaking. Proceeding, he asked—

What had the Gas Committee done during the past ten years, which was the period he had had the honour of being the Chairman. What had been the *result* of what they had done; because, after all, the result was the measure of the success of their work. First of all, they had abolished meter and stove hire, which was a relief to the gas consumers of more than £20,000 a year, and, of course, a direct loss to the revenue to that extent. Then they had given the slot consumers 30 cubic feet of gas for a penny, instead of 25 cubic feet; and as they had now over 44,000 slot consumers, they were paying £8000 a year less than they would be paying if the Committee were only supplying them with 25 cubic feet, instead of 30 cubic feet. Next they reduced the margin between the city consumers and the out-township consumers by 3d. per 1000 cubic feet; and as the out-township consumers used 816 millon cubic feet a year, this was a gift to them of £10,000 a year. He very much feared that the people to whom all these large concessions had been made were utterly unable to appreciate the advantages and privileges which the Committee had offered to them. The Committee next reduced the price for power gas to 2s. per 1000 cubic feet. It was a marvellous thing what a small reduction in the price of gas in a very large undertaking meant. The price for gas-engine use was lowered to 2s. per 1000 cubic feet; and they had now in use 1625 gas-engines. He estimated, and he believed he was right in his estimate, that the Committee had given to the owners of gas-engines at least another £10,000 a year. Then the Committee advanced the wages by 5 per cent. to their employees all round; and this was a lessening of profit equal to £8000 a year. In other words, they put this sum into the pockets of their employees—of those who were paid wages. What had been the result of their policy? Ten years ago they had 82,289 consumers; to-day they had 146,457 consumers. Ten years ago, they had 1481 slot consumers; now they had 44,341. Ten years ago, they had 3379 cooking-stoves; to-day they had 17,000. In one year, after the abolition of stove-hire, the number increased by 5000; and now the department were sending out cooking-stoves at the rate of 25 per day. He might say they had found out by experience that, where there was a cooking-stove in a house, the increased consumption of gas in that house was 33⅓ per cent. at least. Their income in 1894-5 was £579,272; and in 1904, £743,000. The gross profit in 1894-5 was £134,697; and by 1904—in spite of all the concessions they had made, amounting to about £50,000 a year—it had increased to £183,685. In the ten years, they had made a profit of £1,433,567; and they had disposed of this by paying £376,130 interest on loans, sinking fund £315,117, and paid towards the relief of the rates £511,899—over half a million of money! (There were loud cheers on this statement.)

Turning from this review, the Chairman dealt heavy blows at a certain letter in a local paper criticizing the Gas Department; one of the objects having apparently been to impress upon the public how extravagant the Committee had been in the matter of salaries. There were two things he regretted exceedingly about

this letter. First, the utter ignorance displayed by the writer; and, secondly, his exceedingly bad taste in publishing names. In 1894, the wages of the gas undertaking—he was speaking of everything, salaries, wages, and emoluments—totalled to £157,414 per annum, or 10·69d. per 1000 cubic feet of gas sold; but in 1904—the wages having considerably increased, and the business likewise—the wages paid amounted to £172,768, or 8·69d. per 1000 cubic feet. In other words, the Gas Committee were now working the gas business at 2d. per 1000 cubic feet less than ten years ago. This 2d. on the quantity of gas sold meant £40,000 a year. If the writer of the letter knew these facts, then (said Alderman Gibson) "he was lying to the public; if he did not know them, then he was a teacher utterly ignorant of what he was teaching." Another critic of the Gas Committee came in for a sharp dressing; and, before Alderman Gibson had finished, he had proved to the members of the Council that they could not have a more stalwart champion for themselves as representatives of the people than the Chairman of the Gas Committee.

Later on, there was another toast which must not be neglected, and that was "The Employees," with which Alderman Gibson linked the names of Mr. Nickson and Mr. Newbigging. Among his points, the Chairman referred to the day as being a red-letter one, and mentioned that every man in the employ of the Committee would on the following Saturday receive an extra shilling for the day. This was a gem among the *obiter dicta* that fell on the ears of the councillors: "If you want to get work out of your people, you must get into the hearts of your people," Passing on to the staff, the Chairman also asked what would be his own position if he were not loyally supported by competent men? and he ended with the expression of his feeling that the citizens of Manchester ought to be proud and grateful that they had such servants.

The honour of replying to the toast was greatly appreciated by Mr. Nickson, who was also pleased that his name had been associated with the rest of the employees of the Gas Department. He claimed, on behalf of the officials, that, in any criticism that was passed, they should be treated fairly and squarely, and that they should not be charged with a policy over which they had no control, but that they should be estimated as to the efficiency, the integrity, and the honour with which they carried out that policy. "Let us," he said, "have fair and square criticism, and not criticism behind one's back, which one cannot answer. . . . If, in any sense, we fail in our duty, then send us away, and get better if you can." He wanted also to emphasize this, that the officials of the Gas Department were all loyal one to another; and this had a great deal to do with the peace and prosperity of any department. They sought to further one another's interests, and to promote friendships among the staff. (Mr. Nickson, by the way, is the oldest servant of the Corporation; he having served them now for something like half a century.)

In his response, Mr. Newbigging referred, among other matters, to the alterations and extensions at the works. He remarked that, before any of the work had been entered upon, it had been carefully considered by the Chairmen at the respective stations, and afterwards by the Chairman and the General Committee. They had had to be assured that such expenditure was necessary, and afterwards that the money had been properly spent. He believed that in both directions satisfaction had been given. There was one point that had not been touched upon by the Chairman; and that was the question of the selling price of gas. It seemed to be a prevalent idea that gas undertakings should be worked for the benefit of the rates. This he considered to be a mistaken policy. They were one of the few gas undertakings who devoted such a large amount to the relief of the rates; other undertakings sold their gas at the lowest possible price. He wished this policy was carried out in Manchester, because it would very much increase the use of gas; and it would be to the advantage of the consumers and the ratepayers at large. He considered that nothing should be placed in the way of Manchester selling gas at 2s. per 1000 cubic feet. As to the extensions that had been inspected, he was convinced they would have the effect of tending to cause the rate of progress in the ensuing ten years to be in excess of what it had been in the past ten years; and the economies effected would be greater than in the past. He concluded by thanking the Chairman and Committee on behalf of the engineering staff and works employees for their consideration in the past; and he acknowledged most heartily the loyal co-operation he received from the staff and employees generally.

There were other toasts; but these were the ones that were especially pertinent to the occasion. Altogether the day was a most pleasant one; and the Chairman and Gas Committee parted from their friends and colleagues on the Council feeling that friendship had been the more strongly cemented by the inspection and social intercourse. Certainly, too, the immensity and the importance of the work which the Gas Committee have in their charge are now better understood by many among the general body of councillors than they were before the proceedings of last Thursday.

The first monthly meeting of the Institution of Mechanical Engineers after the vacation is to be held on Friday evening, when a paper will be read by Mr. R. M. Neilson, of Manchester, entitled "A Scientific Investigation into the Possibilities of Gas-Turbines."

FURTHER NOTES ON THE INTERNATIONAL GAS EXHIBITION.

From Mr. A. Cooke, the Hon. Secretary of the Midland Association of Gas Managers, we learn that—a sufficient number of replies having been received to justify the Committee holding the autumn meeting in London—he has been desired by the President (Mr. George Helps) to inform the members that the meeting will be held, in connection with the Earl's Court Gas Exhibition, on Saturday, Nov. 26.

Information has been received that a deputation from France is to visit the Exhibition.

The latest entries of firms as exhibitors are: Automatic Cashiers, Limited, Messrs. Babcock and Wilcox, Limited, British Compressed Gas Company, Limited, Consolidated Pneumatic Tool Company, Limited, Mr. William Edgar, Messrs. Grice and Sons, Messrs. Hardy and Padmore, Messrs. Holbrook and Co., Shannon, Limited, and Messrs. J. G. Stein and Co. Other lists have appeared in the last two issues.

On Monday last week there was a meeting of the exhibitors at the Holborn Restaurant, when about sixty of the firms were represented by principals or delegates. Messrs. F. W. Bridges and G. D. Smith, the Organizing Managers of the exhibition, have forwarded the following notes on the proceedings: The Chairman of the Advisory Committee of the Institution of Gas Engineers (Mr. J. W. Helps) was voted to the chair, on the motion of Mr. C. Clare (of Messrs. Fletcher, Russell, and Co., Limited), who is Chairman of the Exhibitors' Committee. The Chairman explained that considerable progress had been made with all the arrangements in connection with the exhibition; but it was scarcely necessary to weary the meeting with details as the technical press had already published pretty well all there was to know. As to the space, more than 95 per cent. of it had been taken up, and other applications were coming in; so that all who applied would not be able to be accommodated with positions. Mr. Bridges, on behalf of the management, stated that the railway companies were still debating the question of reduced rates; but he feared that only parties would be able to secure those privileges. Excursions were being arranged in connection with other events in London about the time of the exhibition; and directly the fixtures were known, a post-card would go to every gas-works, gas-fitter, and others interested, advising them of the excursion. All the great lines were arranging to exhibit the new poster; and the District Railway would alone exhibit 450 large and small posters over their system. Of the new poster, 9000 had been ordered to begin with, and the hoardings throughout London and the suburbs would soon have copies of these posters on them. The question having been asked at one of the meetings as to what steps were being taken to secure the attendance of ironmongers, Mr. Bridges announced that every ironmonger throughout the British Isles would receive two tickets which would be presented by the "Ironmongers' Chronicle." Window bills would be sent to all gas-fitters in Great Britain. The various gas companies throughout the country had also ordered nearly a quarter-of-a-million circulars, and half-a-million tickets, to send to their customers. Regarding the stands, over 170 would be occupied by nearly as many exhibitors—some exhibitors occupying more than one stand. The Princes Hall would be full of machinery, nearly all of which would be in motion. There would also be moving machinery in some parts of the Queen's Palace. The Queen's Palace Annexe (connecting the Ducal Hall with the Queen's Palace) would be devoted primarily to the suite of furnished rooms. As to exhibitors and assistants' tickets, these would be supplied in any reasonable number; but the management naturally looked to the exhibitors to see that these tickets were not improperly used. A sample admission ticket was passed round, which the management were willing to supply to exhibitors to send to customers, &c., at 3s. per dozen; or, it was mentioned, parties ordering 500 or more could have their own name printed on the ticket with the number of their stand. In a week or two the exhibition would be largely advertised in the daily papers. Various other methods of advertising the exhibition extensively were in contemplation; and a large gathering might be anticipated. In answer to a question as to the erection of stands, Mr. G. D. Smith stated that the work might commence on Nov. 1, or thereabouts; but, in special cases, a little earlier date might be arranged.

The Exhibition and Railway Fares.—Mr. R. Bruce Anderson writes: "With reference to Mr. Helps' remarks at the meeting on Monday last, it is to be hoped that the railway companies will grant the fare-and-quarter terms; but for visitors from a distance, it is idle for them to talk of parties of a dozen or fifty. From Scotland and Ireland, it is not likely there will be more than two or three start from any point—say, the manager, his foreman (whom it is desirable he should have with him), and possibly a prominent consumer or two. It is not desirable the party should be made up to the requisite strength by neighbouring towns joining hands, as when a gas manager leaves home, especially with his foreman, the freemasonry existing among gas men naturally makes one rely on friendly aid from an adjacent town, in the event of difficulties arising. The matter should be tackled from the London end. Let the Exhibition Secretary issue vouchers to all

gas officials, and through them to consumers who have *bonâ fide* specially travelled to London to see the exhibition. Let these vouchers be presented to a Railway Clearing House officer stationed at the exhibition along with return halves of tickets. He could then refund the abatement, keeping the voucher, and endorsing the ticket."

AUTOMATIC STEEL-YARD COAL-WEIGHER.

At gas-works, the question of weighing the incoming coal, expeditiously and yet with certainty, has been receiving much more attention of late than formerly; and no scheme of new gas-works or extensions in which the coal supply is mechanically dealt with is now considered complete without the interposition, at some point on the line of travel to store or hopper, of a weighing-machine. The newest thing in this way is an electrically controlled weigher of the steel-yard type, to which Messrs. W. & T. Avery, Limited, call attention. The weighing of material of such a varied character in size as coal, is not the easiest of matters; but we are told by the firm that their new apparatus is most efficient in this respect, and that the machines are made in different sizes suitable for a feed of from 30 to as high as 300 tons an hour.

In this new machine, the coal is deposited in a weigh-hopper, the inlet to which is controlled by two gates. The supply is stopped by the closing of the first gate, with the exception of the merest stream through an aperture left expressly for a purpose to be explained. The second gate is then made to operate in order to cover the aperture—so completely shutting off the supply. Attached to the gates is a lifting lever worked by a worm and wheel, driven by an electric motor, which runs continuously. In starting the machine, a clutch is inserted between the gearing and the lifting lever; and the gearing at once commences to wind up the gates, which, when fully open, are held in position by catches; the clutch being then automatically thrown out of gear. By electrical means, too, the gates are released and are allowed to fall.

The proportional weight of the steel-yard is set to the point indicating the amount of coal or other material it is wished to weigh; and the steel-yard is, in consequence, depressed on its stop. Two levers, each carrying an adjustable weight, are fulcrumed so as to exert a comparatively slight upward pressure of the steel-yard. On the gates being fully opened, the material drops into the weigh-hopper until it contains a large proportion of the amount the machine is set to weigh. The pressure thereby brought to bear on the steel-yard partially lifts it; assistance being rendered by the weights previously referred to. A slight upward movement of the steel-arm causes the first lever to drop on to a stop, and so completes the circuit to one of the electro-magnets, resulting in the catch of the main gate being drawn aside, and so allowing the latter to fall. Thereupon the steel-yard again comes to rest, while the lessened flow of material proceeds until the weigh-hopper is charged sufficiently to further lift the steel-yard. The second lever then drops, and completes the circuit of the second electro-magnet, which results in the complete shutting off of the supply by the closing of the second gate. Equilibrium is then found to have been attained. With the fall of the second gate, the circuit of a third magnet is completed; and the action causes the release of a locking latch which secures the lever of the hinged bottom door of the hopper. When the contents are discharged, a balance-weight closes the door; and this simultaneously causes the clutch to again engage with the gearing—the same cycle of operations as described being again performed. Every weighing is automatically registered by means of counter mechanism.

TESTS FOR SULPHUR COMPOUNDS.

Recent volumes of the "Zeitschrift für analytische Chemie" have contained the results of investigations in connection with the above subject which it may be of interest to briefly notice.

In Vol. XLII. of the work cited, Herr Walther Feld has given a method for separating sulphides from chlorides, iodides, and bromides. When no other sulphur compounds are present, the mixture may be distilled with magnesium sulphate in a current of carbon dioxide, and the sulphuretted hydrogen received in a standard iodine solution. The haloid is thereafter precipitated from the residue in the retort. Another method is to precipitate both sulphide and haloid with an excess of silver, and estimate the unconsumed silver in an aliquot part of the solution. The precipitate, without washing, is then distilled with hydrochloric acid and aluminium clippings in an atmosphere of carbonic oxide, and the sulphuretted hydrogen estimated as before. The same method serves for the reduction of thionic acids to sulphuretted hydrogen. The sulphur of the polysulphides may be converted into sulphocyanide by treatment with potassium cyanide (KCN). The haloids are estimated in a separate portion of the solution, after boiling with magnesia (MgO) and mercuric oxide, which precipitates all the sulphur compounds as mercuric sulphide. Should the original solution be alkaline, magnesium sulphate is added; but acid solutions are neutralized with magnesia. Ammoniacal solutions must also be boiled with magnesia before the mercuric oxide is added.

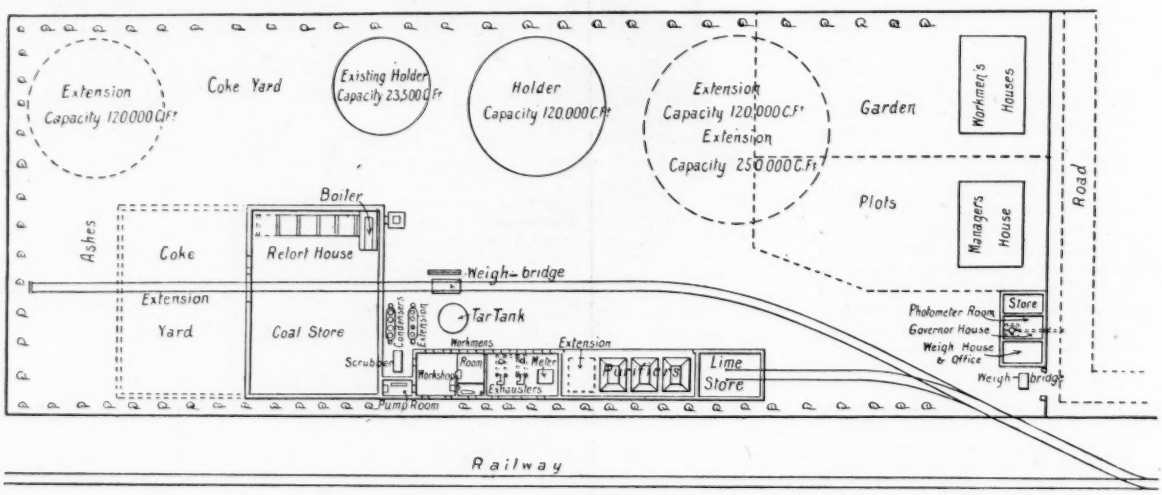
In the next volume, Herr Reichard described a test for sulphuretted hydrogen in combination with ammonia. A drop of a saturated solution of sodium nitroprusside gives an intense violet colour with 0·004 c.c. of an ammonium sulphide solution containing 0·000018 gramme of sulphuretted hydrogen. The sensitiveness of the reaction depends more on the concentration of the sulphide solution than on the absolute amount of sulphide. The same quantity of sulphur, whether in the form of sodium sulphide or sodium or ammonium hydrosulphide (NH_4HS), gives the same intensity of reaction. Presence of excess of caustic soda prevents the development of the violet colour; but excess of ammonia has no such preventive action. A very dilute solution of soda or potash, and a very much stronger solution of ammonia mixed with sodium nitroprusside ($Na_4[CN]_{10}[NO]_2Fe_2$) develops a yellow coloration. The yellow solution obtained by saturating caustic soda with sulphur does not give the violet colour with nitroprusside. This colour is in all cases ephemeral.

At the International Engineering Congress held under the auspices of the American Society of Civil Engineers, in the Convention Hall at the St. Louis Exhibition, from the 3rd to the 8th inst., papers were presented in Section B on the "Purification of Water for Domestic Use," by Mr. Allen Hazen, of New York City; M. Bechmann, of Paris; M. Ad. Kemna, of Antwerp; and Mr. J. M. K. Pennink, of Amsterdam. The Chairman of the section was Mr. J. J. R. Croes, a Past-President of the American Society of Civil Engineers.

THE NEW GAS-WORKS OF THE NORTH BERWICK CORPORATION.

The handsome new gas-works at North Berwick, which were formally opened last Thursday, are the completion of a scheme which was clearly in view when the Corporation acquired the gas undertaking eleven years ago. At that time it was but a small concern; the quantity of gas made in the first year of the Corporation management having been 10½ million cubic feet. The capital with which they started was £7500; so that it was apparent that, unless business expanded, the burgh could not face much further capital outlay. It was consequently some years before much was heard about removal. But the business continued to grow at a rapid rate; and when, a year or two ago, it was found that the make of gas had doubled since the transfer, it was felt that a move could be made—and indeed must be. Now the annual make of gas is upwards of 23 million cubic feet. The capital account has been raised to £21,569, which includes the value of the old works, depreciated by the operation of repayment of loans, and the cost for the new gas-works, which, roughly, has been £16,000. It is interesting to note how closely the capital account corresponds with business done. Mr. W. R. Herring gives the average capital expenditure upon gas-works at £6 8s. per ton of coal carbonized. In 1894-5, the quantity carbonized at North Berwick was 1150 tons, which brings out, upon Mr. Herring's basis, £7360 as the proper amount of the capital account. Last year the coal carbonized was 2475 tons, which brings out a capital account of £15,540. This calculation does not take into consideration the difference between the cost of the new works and the actual capital account; and lest it should be assumed that this account, as a whole, is too high, it may be pointed out that the old works have to be liquidated, that the new ones, as they stand, are capable of dealing with double the present output, and that an unusually long main had to be laid to connect the new works with the town. When these matters are taken note of, it may be that the capital account will still be high; but then North Berwick is just the very place where a proportionately large outlay might be expected. There are no slums in it; it is a highly fashionable town patronized by Royalty; and therefore it will be conceded that something had to be sacrificed on æsthetic grounds. Our view is that, all things considered, the undertaking has been capably handled upon its financial side; and we do not forget that the progress which has been experienced in the business testifies to the practical side of it having been most zealously looked after by Mr. J. Black, the Manager. The present position of matters fully justifies the Corporation in making the very liberal provision they have for the future needs of the community. They have proceeded upon the principle that if they are to achieve success they must deserve it. They have recognized that if they are to have their visitors' lists swelling year by year, they must not grudge some outlay to make those visitors comfortable. That this confidence in themselves may not be displaced is the hope of everyone, not only for the sake of the Corporation and ratepayers, but of the nation at large; for, as Mr. Haldane, in his opening remarks, implied, the prosperity of the nation in general means the prosperity of such places as North Berwick.

A word now as to the gas-works themselves. They are very suitably situated, have been excellently designed and well built and equipped; and altogether do credit to Mr. James M'Gilchrist, the Engineer and Architect, and to the Contractors (Messrs. H. Balfour and Co., Limited), who erected them.



GROUND PLAN OF THE NORTH BERWICK NEW GAS-WORKS.

In laying out their new gas-works, the Town Council wisely decided to seek a site on the outskirts of the town; and they secured 2½ acres of land three-quarters of a mile distant from the burgh. The works have been constructed in accordance with the designs of Mr. James M'Gilchrist, of Dumbarton, who has been the adviser of the Town Council since they became gas undertakers. Costing about £15,000 (excluding the workmen's houses), the new works will be able to produce 50 million cubic feet of gas per annum. Throughout, the buildings have been constructed on fire-proof principles, and the plant installed is of the pattern the Engineer's wide experience warrants him in recommending. In the retort-house, with its ample ventilation and lighting provisions, the working conditions ought to prove most satisfactory. The bench is designed on the regenerative principle, which gives excellent results as to economy both of heating-fuel and upkeep; the settings being those of Messrs. R. & G. Hislop, of Paisley. The total number of retorts arranged for is 28. The coal-store is designed for a two months' supply. The condensers are annular, and are arranged to work at varying temperatures. In the scrubber and tar-extractor, the purifying is done by means of rotary brushes; this part of the plant being by Messrs. Henry Balfour and Co., of Leven. Duplicate exhausters, capable of passing 15,000 cubic feet of gas per hour, have been erected by Messrs. R. & J. Dempster, of Manchester; while the station meter, of a capacity of 10,000 cubic feet per hour, is by Messrs. James Milne and Sons, of Edinburgh. The purifiers are three in number. The largest of the gasholders has a storage capacity of 120,000 cubic feet. An interesting and labour-saving convenience is a large overhead tank, into which is pumped, by means of a connection with the scrubber pump, the liquor and tar from the well underground; the liquids being then run by gravitation into railway-tank waggons. The range of office-buildings is conveniently apportioned, while the Manager's house is neat and suitable for its purpose.

The idea of building special workmen's houses is novel in Scotland; and it will be interesting to observe how the employees appreciate the scheme. Four of these houses have been built, having accommodation of two rooms and a kitchen.

Altogether the designing of the works should tend to the economical working of the undertaking; and, while immediate wants have been fully attended to, due provision has been made for future extension.

THE OPENING CEREMONY.

The works were formally opened last Thursday by the Right Hon. R. B. HALDANE, K.C., the Member of Parliament for the County of Haddington. A company approaching 300 in number had been invited to assist in the proceedings; and the day being beautifully fine, nearly every one attended. The party assembled at the North Berwick Railway Station, whence a special train conveyed them to the works, which are nearly a mile outside the town. The train was taken into the works, where the visitors alighted under a display of flags.

Passing into the retort-house, Provost MACINTYRE introduced to the visitors the Engineer, Mr. M'Gilchrist, who, he said, would describe the works.

Mr. M'GILCHRIST said he had great pleasure in asking Bailie Sim, the esteemed Convener of the Gas Committee, to start the operation of gas making by charging a retort.

Doffing his coat, Bailie Sim, amid cheers, complied, and was complimented upon the deftness with which he handled the shovel.

Mr. M'GILCHRIST then said they had seen the work of charging a retort very well performed. He was sorry he had not time to show

them the operation of heating the retorts, which would have been, perhaps, more interesting, because, by simply opening a hopper the coke drawn from the retort, after the gas had been extracted, dropped into the furnace underneath, without cooling; and it was there converted into gas, which was used for heating the retorts, producing a better and a more equal heat than was obtained by direct firing. The building they were met in was the coal-store and retort-house combined. They would observe that the North British Railway Company would bring the coal direct into the house; and he believed that coal which was raised on Monday would perhaps be consumed as gas in North Berwick on Thursday. The feature of the building was that there was sufficient light and ventilation in it, so that the men could do their work with something akin to pleasure. The retort-house was capable of manufacturing twice the quantity of gas that was now required; for the Town Council had been far-seeing, and had taken enough ground to enable them to quadruple the present output. But it was interesting to know that if North Berwick continued to progress as it had done in the past, within the next ten years he would be called upon to make an extension of the works.

Mr. M'Gilchrist then went round the works with the visitors, giving, at each point, a brief but clear explanation of the operation of the plant—Mr. Haldane being an eager listener all the while, and sometimes a keen questioner. In the governor-house a pressure-gauge with dial had been fitted up; and the opening ceremony consisted in Mr. Haldane turning the gas on to the gauge, which showed that it was going into the town at a pressure of 3½ inches. Mr. Haldane subsequently visited the houses which the Town Council have erected for the men employed in the works. They contain two rooms, a kitchen, and a bath-room; and he declared them to be very creditable to all concerned. At the close of the inspection, the party returned to the coal-store, where they partook of refreshments.

Provost MACINTYRE, who presided, said the visitors had been shown round the works by Mr. M'Gilchrist, and they would, he thought, have thereby obtained a very fair idea of the process of gas manufacture. They had now come to the pleasant point of asking Mr. Haldane to declare the works open. He had great pleasure in doing this, and also in presenting him with a key as a memento of the occasion. The inscription on the key was: "Presented to the Right Hon. R. B. Haldane, K.C., M.P., on the occasion of his opening the North Berwick Gas-Works, 13th October, 1904." He concluded by expressing the hope that Mr. Haldane would be long spared, and that he would value the key, not for its intrinsic worth, but as a recognition of the thanks of the North Berwick community.

Mr. HALDANE said it was to him a peculiar pleasure to open the works, and to receive the beautiful key just presented to him, because the works were thoroughly up-to-date. In their skilled adviser, Mr. M'Gilchrist, he thought he might congratulate them in having found a thoroughly up-to-date engineer—one with the ideas of the twentieth century in his head; and in the works he had built every waste product was made use of. The most modern regenerative processes were employed for making the coke available, in the most economical manner, for heating the furnaces; and what was the result? In the old time, before the gas undertaking was acquired by the Corporation—that was to say, before 1893—gas used to cost 6s. 8d. per 1000 cubic feet in North Berwick. With these works the Corporation would be able to supply gas at 3s. 9d., and not only to do this, but to include in the price enough to provide for the interest and sinking fund on the £16,000 which had been expended. He called this a great achievement in municipal finance. If this worked out—and there was every prospect of its doing so—they in North Berwick would have done something of which they might be proud; and there was a prospect of their being able to reduce the price of gas still further. A great deal of abuse was being launched at the head of corporations for engaging in what was called municipal trading. There was municipal trading that was open to criticism—when people employed the rates to enter into competition with private individuals, when they borrowed recklessly, and when they did not keep their accounts in such a form as to show the cost. But in the case of their Corporation, in the gas undertaking, the figures they gave showed what a splendid thing municipal enterprise might be when conducted in the right fashion. And it was not only in the gas undertaking that North Berwick was entitled to this credit. Their modern water-works, which had made such a difference to their community, were, perhaps, the most important achievement of the Corporation within the last few years. He had no fear for the future of North Berwick, because Nature had endowed it with an unrivalled sea, with splendid golf links, and with a climate which left nothing to be desired. He would bring his remarks to a close by expressing his pleasure in being able to make the formal declaration that the North Berwick Gas-Works were now open, and he trusted would be successful.

The key which was presented to Mr. Haldane was of gold, and bore on the handle on one side an enamelled shield displaying the burgh arms, and on the other the inscription already given.

Provost MATHIESON, of Innerleithen, proposed the toast of "The Town of North Berwick." He thought the Council were to be congratulated upon the high efficiency of the municipal machine in the burgh, and had reason to be proud of their latest undertaking.

Provost MACINTYRE acknowledged the toast.

The Rev. J. R. BURT, Parish Minister of North Berwick, proposed "The Gas Committee." He said he thought he spoke the sentiments of the community when he conveyed to the Committee their thanks for the assiduity, zeal, and thorough efficiency with which they had discharged the work committed to them.

Bailie SIM, with whose name the toast was coupled, returned thanks. He said that though the Committee might have had rather a greater share than the Town Council in connection with the erection of the gas-works, they must not forget that a large amount of praise was due to the Council likewise, as all the different details of the scheme had been considered by them, and it had been by their instructions that the Committee had carried on the work. He believed the first step was taken by the Council about eleven years ago, when they resolved to acquire the gas-works; and they were now reaping the benefit of the scheme then introduced, which included the removal of the old works, which were an eyesore. Perhaps the greatest benefit of all to the community had been in their being able to reduce the price of gas from 6s. 8d. to 3s. 9d. per 1000 cubic feet. They had now gas-works of the most modern type, and they would be able to carry them on with a good deal more economy than they had done in the past.

Mr. KENDALL proposed "The Engineer." He said that one of the most difficult tasks they as a Gas Committee had was to select a proper man to carry out the new works, because he not only required to be an engineer, but an architect as well. He thought they would join with him in saying that, in making the selection they did, they were fortunate indeed. He could assure them, without the least reservation, that they had not had the least hitch in their work. Mr. M'Gilchrist was a power in himself. He had gone straight ahead, and had had the thing done properly. He was so sanguine as to say that, instead of their gas being 3s. 9d., as it was at present, in a few years it would be down to 3s. Mr. M'Gilchrist was the Engineer who acted on their behalf in taking over the gas-works; and they were very well satisfied with him then. They were thankful to him now for the manner in which he had brought their new scheme to a successful issue.

Mr. M'GILCHRIST, in responding, said he was afraid that Mr. Kendall had been altogether too flattering. However, he was quite pleased to see the works as they were that day; and considering that the foundation stone was laid somewhere about the middle of January, and they were completed in October, he thought it was creditable to the Contractors and to all others connected with the work. He had had no trouble whatever with the Contractors. There had been no friction with either them or the Town Council; and it was very seldom that this could be said. On behalf of the Contractors and himself, he had great pleasure in presenting to the Royal Burgh of North Berwick a Provost's lamp. It was exactly a copy of the lamp-pillars which were supplied to the Lord Provosts of Glasgow, the only change being in the lantern, the panes of which, instead of having the coat of arms of Glasgow, would have the coat of arms of North Berwick. He hoped the lamp would be handed down to Provosts yet to come. He had still another presentation to make. On behalf of the Contractors and himself he had very great pleasure in asking Bailie Sim to accept a bronze statue, which he thought was appropriate, inasmuch as the shipwrecked mariner was represented holding aloft a gas-light. The inscription upon it was: "Town Council of North Berwick. Presented by the Contractors and Engineer to Bailie Sim, Convener of the Gas Committee, at the Opening of the New Gas-Works, 13th October, 1904." He could say truly that Bailie Sim had given a large percentage of his time in attending to the business connected with the erection of the new works; and he thought this was a small recognition—small indeed—of the trouble to which he had been put.

Provost MACINTYRE and Bailie SIM returned thanks for these interesting gifts.

Bailie SIM then proposed "The Contractors," coupling with the toast the name of Mr. R. W. B. Creeke, of Messrs. Henry Balfour and Co., Limited, of Leven. When he mentioned that not a single leak had been found in the gasholder they erected, they would recognize that very good work had been done.

Mr. CREEKE, in acknowledging the toast, said that in the carrying out of their work they were much indebted to Mr. M'Gilchrist for the very clear way in which he brought every matter before them, and to his son for the careful manner in which he carried on the work without in any way interfering with the Contractors. He congratulated the Council and the community of North Berwick on the really fine gas-works they now had in their possession.

Mr. DICKSON proposed "Neighbouring Burghs;" and Provost GIBB, of Dunbar, acknowledged the toast.

The CHAIRMAN proposed Mr. Haldane.

Mr. HALDANE, in returning thanks, said it was nearly twenty years since he first became connected with the county, and he could unhesitatingly say his relations with it had been as pleasant as those of Mr. M'Gilchrist with the Contractors and the Corporation.

The company then returned by train to North Berwick. Luncheon was served in the Royal Hotel to visitors from a distance, at the close of which a few complimentary toasts were duly honoured.

The new gas-works were open for inspection by the public on Friday and Saturday; and considerable numbers availed themselves of the privilege.

"Lass's Analysis" for 1903-4.—It will be seen by an announcement which appears elsewhere, that the 24th annual issue of the above-named work, compiled by Messrs. Wood, Drew, and Co., is now ready. It contains statistics of the Metropolitan Water Companies for the year ending Dec. 31, 1903, or March 31, 1904, uniform in arrangement with those of the preceding years; and an index is furnished to the various tables. The fact that this is the last complete financial year of the Companies (seeing that their undertakings were transferred to the Metropolitan Water Board on the 24th of June), will not detract from the acknowledged usefulness of the book, inasmuch as, by the omission of matter relating to the Companies' statutory powers as to dividends, the compilers been been able to give analyses of the accounts of fourteen of the principal Provincial undertakings, in addition to those of Edinburgh, Glasgow, and Manchester, which have been included in the "Analysis" in recent years. It will thus be seen that the scope of the work has been considerably enlarged. In whatever form the accounts of the eight "districts" which now represent the Metropolitan Water Companies may appear, there will doubtless be ample material in them for the exercise of the compilers' skill; while the additional matter to which we have called attention will enhance the value of a work which has already attained a well-deserved reputation as an authoritative collection of water supply statistics.

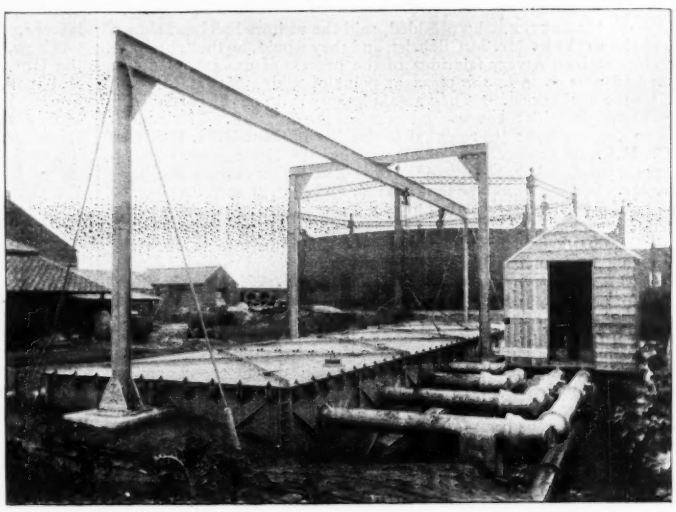
EXTENSIONS AT THE BECCLES GAS-WORKS.

An Old Concern Modernized.

The present is the Jubilee year of the incorporation of the Beccles Water and Gas Company; and it has been signalized by the carrying out of some very necessary extensions at the gas-works, to enable the plant to meet increased demands upon it. The improvements have been effected at the suggestion and under the supervision of the Company's Manager (Mr. W. Methven), to whom we are indebted for the following particulars.

The original works were erected in the interval between 1837 to 1840, by Mr. John Malam, who about the same time built a number of gas-works in the district. They subsequently passed into the hands of a Mr. Samuel Brown, who appears to have acquired several others; among them being those at Bungay. In 1854, he sold the works to a Company formed under the title of the Beccles Water and Gas Company, who in that year obtained an Act of Parliament "for providing water-works, gas-works, and public baths and wash-houses" for the town and borough. Authority was given by it for the purchase of the existing works, with the adjoining land, for the sum of £3500, to which were added the expenses incidental to obtaining the Act, bringing it up to £5563. The capital of the Company was £20,000 in £10 shares. After the Act was obtained, it was decided to allow the water powers to lapse. The Company struggled on for many years, paying no dividend, or only a small one. Business was limited and leakage was high. This state of things continued until the railway was made; and then there was improvement. The first Manager was Mr. T. Hill Methven, who held the position from 1854 till 1857; subsequently becoming Manager of the Bury St. Edmund's Gas-Works, and Lessee of several others in the district. Mr. Methven was succeeded by Mr. William Romans; but he did not remain long with the Company. The accounts presented at the general meeting on March 16, 1857, showed a balance of £169; and the dividend paid was 3 per cent. The capital was then about £7000, and the price of gas 8s. 6d. per 1000 cubic feet. At the close of the financial year ending March 31, 1903, the capital was £12,350; and the make of gas 20 million feet. The price is now 4s. per 1000 cubic feet. At the end of the year, the daily production amounted to upwards of 90,000 cubic feet. It became perfectly obvious to the Manager that his plant was being sadly overworked. The condensers consisted of twelve 5-inch water pipes 15 feet long; the gas leaving them at a temperature of 120° Fahr. Curiously enough, notwithstanding the favourable reports on the Sheffield cure, the naphthalene trouble was very prevalent. The purifiers consisted of four 5 feet by 10 feet boxes, with one of Malam's wet centre-valves having only an 8-inch seal, which could not be increased. During the heaviest make last winter, the tar from the hot gas fouled the lime to such an extent that the bottom layer always came out quite black—absolutely saturated with tar. Without warning, the pressure would rise to 8 inches or more, and the water would be blown out of the centre-valve, resulting in loss of gas through the unused purifier and the bye-passing of the purifiers. Notwithstanding the exercise of the utmost vigilance, the whole of the gas in the holders was on several occasions fouled. Just before Christmas, testing in the ordinary way was useless. Boxes had to be changed every alternate day by the pressure-gauge—that is to say, when the gauge reached 6 inches, the clean box had to be put on, regardless of whether or not the lime was fouled. Needless to say the lime bill was very heavy, amounting to nearly £100 per annum.

Early in the present year, Mr. Methven laid before his Directors a scheme for the entire remodelling of the purifying plant—consisting of a 9-inch foul main and an additional washer-scrubber—and an extension of the town mains; the estimate being £1000. The Directors were rather surprised to learn that the plant needed the expenditure of this amount upon it. Feeling the absolute necessity for the work, from both the Company's and the townspeople's point of view, Mr. Methven suggested that some independent engineer should be called in. The Directors agreed to this, and Mr. Norton H. Humphrys was asked to report on the Manager's plans and the condition of the works generally. He did so, and supported Mr. Methven in every particular; suggesting the advisability of raising further capital. After the consideration of the report, the Directors decided to put in four purifiers and a foul main (leaving the washer-scrubber for next year), and to pay for the work out of revenue spread over two years. Several firms were invited to tender for the new plant, and Messrs. Ashmore, Benson, Pease, and Co. obtained the contract, which they have now completed. The foul main is 9 inches in diameter, and is carried on brackets on three sides of the retort-house. Cleaning-doors are provided at all bends, tees, and elbows. The purifiers are 12 feet square and 4 ft. 6 in. deep, set in a line, three sides in common, and the covers are on Green's system, practically the full size of the boxes, and are held down by 36 bolts. The boxes are worked by a 9-inch Weck centre-valve. As the intention is to use oxide in three of the boxes, at any rate at present, and lime in the fourth, the last box is worked by three slide-valves on the outlet of the centre-valve, while the inlet and outlet of the fourth box are connected by a dummy bend. Of course, this method is open to objection; but apparently illuminating power is not of the importance it used to be, and its value may further decrease in the near future. Lime can then be dispensed with, the slide-valves taken out, and all four boxes worked by the centre-valve. As will be seen by the illustration, the lifting gear is very simple (the covers weigh barely a ton), and consists of one rolled iron joist running the whole length of the boxes, and supported by two suitable columns at either end. In the centre of the boxes is a transverse joist, held up in the same manner. The connections are all 9-inch. The Company have put in all the foundations and made all the connections from the inlet and outlet of the centre-valve. On taking out the old purifiers, put in in 1869 (they were second-hand then), the Manager was astonished at the thickness and toughness of the metal; and he could not help wondering whether the material now sold will last close upon sixty years. The two gasholders shown in the illustration have capacities of 30,000 and 90,000 cubic feet respectively. The company obtain their supply of raw material by means of the River Waveney. It is brought up to the Company's quay in 40-ton wherries, and delivered from them into the retort-house by a Temperley transporter at a cost of 3½d. per ton. The Company work up their residual products.

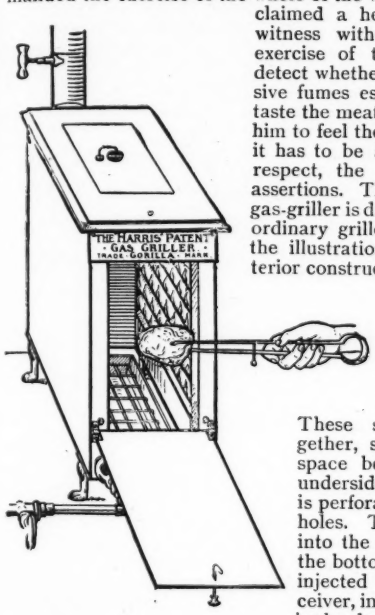


Coke-Oven Gas and Tar as Fuels.—According to a "Note" in "Engineering," an attempt to use coke-oven gas, from Otto Hoffmann retort-ovens, as the sole fuel for open-hearth furnaces resulted in failure; but by using, in addition, a certain quantity of coke-oven tar, delivered to the burner in the furnace through a steam-heated main, there was no difficulty in maintaining the desired temperature in the furnace. The tar also gave satisfactory results when used alone as fuel. For the production of 1 ton of steel, 17,127 cubic feet of coke-oven gas of 550 B.T.U. per cubic foot, and 584 lbs. of tar (15,781 B.T.U. per pound "solid"), were required; while when producer gas was employed, 1076 lbs. of coal (12,500 B.T.U. per pound) were needed. The sulphur introduced into the process by the fuel (1076 lbs. of coal) was 22·596 lbs. when producer gas was used, and 13·693 lbs. when the fuel consisted of coke-oven gas and tar (17,127 cubic feet of gas and 584 lbs. of tar). If tar alone had been used, only 4·88 lbs. of sulphur would have been introduced.

Something New in Incandescent Mantles.—Under this heading, the "Scientific American" recently published the following translation from the "Neue Erfindungen und Erfahrungen." "It is well known that incandescent mantles made from thorium oxide and cerium oxide are far from being durable. The various additions of aluminium oxide, beryllium oxide, silicium dioxide, and others, confer greater stability upon the network, it is true; but alas! at the expense of the light-emitting power. When made up according to the following process, not only may a stable network be obtained, but also one which possesses a high power of light-emission with the use of thorium and cerium in combination with fluorhydric acid. An aqueous concentrated solution of thorium is compounded with fluorhydric acid, heated a short time, and to it is added a combination of cerium dissolved in water by means of some organic substance such as cerium oxalate. This compound gives good results. The formula is as follows: 59·4 grammes of thorium nitrate, 1 gramme of cerium oxalate, 0·8 gramme of fluorhydric acid, 3 grammes of pyro-catechin (the last to dissolve the cerium oxalate), and 135 grammes of water. The textile material is thoroughly impregnated with this solution after the prevailing methods, and then calcined." We shall look, with interest, for further particulars as to these mantles.

THE HARRIS PATENT GAS-GRILLER.

Something new and worthy of attention in the way of a gas-griller has been shown to a representative of the "JOURNAL" by Mr. A. E. Harris, the inventor, at his office at 64, Finsbury Pavement, E.C.; and not only has the article itself been seen, but its performance has been witnessed and the viands tasted. Mr. Harris (who, by the by, is a dentist, as was the late Mr. Thomas Fletcher before he commenced the manufacture of gas-stoves) really demanded the exercise of the whole of the writer's five senses. He claimed a hearing, called him to witness with his eyes, invited the exercise of the organ of smell to detect whether there were any offensive fumes escaping, pressed him to taste the meats he cooked, and asked him to feel the bread he toasted. And it has to be avowed that, in every respect, the results sustained the assertions. The outer form of the new gas-griller is different from that of the ordinary griller, as will be seen by the illustration; but it is in its interior construction that the secret of success is found. On either side of the interior, there is a double sheet of corrugated sheet-iron; the corrugations running from front to back. These sheets are bolted together, so as to leave a thin space between the two. The underside of every corrugation is perforated with a row of fine holes. The gas supply is led into the front of the griller at the bottom on either side; being injected into a bell-shaped receiver, into which the air supply is also drawn. This is connected up with a mixing-tube running the full length of the griller, and perforated on top. On to this, the double corrugated plate is firmly seated so as to form a gas-tight joint; and the connection and mixing-tube are also enclosed in an outer casing. As the illustration shows, there is a swing door in front, which is fastened up by a latch while the griller is in use.



Now the effects of this construction are: First, uniform distribution of jets and heat on both sides of the griller from top to bottom and from front to back. Secondly, before reaching the numerous points of ignition, the mixture of air and gas becomes highly heated, with the result that there is perfect combustion; and the sulphur compounds are, the inventor says, also completely oxidized. One medical gentleman, writing on the subject, says the griller "avoids a defect which is so common in many gas-stoves, of allowing the flames to impinge on a thick mass of cold metal, which causes imperfect combustion, and a very unpleasant smell when the stove is started. In the "Harris" griller, the flame strikes on to a thin sheet of iron, which heats immediately, and so imperfect combustion is avoided." The consumption of gas, when the griller is in full use, is about 30 cubic feet per hour; and, burning gas at this rate, and only a few minutes after the griller was lighted up for the demonstration, a thermometer registered 1300° Fahr. Another important point is this, that the steaks, chops, fish, sausages, or such-like are suspended vertically in a wire cage which slides into grooves in the top of the griller. The meat or fish is laid on one side of the cage, and the other side (which is hinged) is brought over and fastened—thus holding the contents firmly. The suspension of the meat or fish in this manner, with a uniform heat all round it, ensures its simultaneous cooking in every part. It was rather feared by the observer when the demonstration commenced with a steak, that the outsides would be charred, and the inside indifferently cooked. But about four minutes sufficed for the cooking; and the fears were not realized. The steak was thoroughly well done throughout, with the further advantage that it had retained its juices, which did not escape until the meat was cut. This is accounted for in this way: "Through the instantaneous action of the heat to the whole surface of the meat to be cooked, the albumen is at once coagulated, and thereby prevents the escape of the juices from the interior, which, on reaching their respective boiling-points, expand the cell fibres, and thus contribute in the interior to that chemical and physiological action and re-action intended with the process of cooking in a more perfect manner than has hitherto been obtained by either cooking, roasting, stewing, or steaming of meat, &c." A sausage was also cooked perfectly in two minutes, and rashers of bacon with the same rapidity. In larger stoves constructed on the same principle, a fowl has been cooked in eight minutes; and a shoulder of lamb in about twenty minutes.

What Mr. Harris claims is that he has solved the problem of rapid cooking, at the same time retaining within the meat its nutritive properties, and developing to the fullest degree its flavour. What more can be desired?

A GAS MANAGERS' ASSOCIATION FOR THE NORTH OF IRELAND.

A Meeting of Gas Managers in the North of Ireland was held in the Y.M.C.A. Rooms, Belfast, on Tuesday last, for the purpose of considering the proposal to establish an Association in the North. There was a fair attendance. On the motion of Mr. Frizelle, of Holywood, Mr. James Brodie, of Omagh, was asked to preside. In opening the proceedings, the Chairman referred to the reasons for the meeting being called. He stated that the primary idea was the formation of an Association to meet every three or four months in Belfast, with occasional visits to neighbouring works. These meetings would be for the consideration of matters in the every-day life of gas managers. The Association, however, was not intended in any way to interfere with, or detract from, the working or the usefulness of the Irish Association, but rather to act as a feeder and an incentive to the preparation of papers for it. There were plenty of matters continually cropping up which would be fit subjects for discussion, and which, when carried a few points farther, might form a short but interesting essay at the annual meeting of the parent Association every August. He was indebted to Mr. J. G. Tooms, of Waterford, for information concerning the working and a copy of the rules of the South-East District Association. Before going further into the matter, he said he would take the opinion of the meeting as to the advisability of forming an Association for the North. On the motion of Mr. Harrison (Monaghan), seconded by Mr. Roberts (Newtownards), it was agreed that one should be formed, under the name of the Northern District of Ireland Gas Managers' Association. The rules were then drawn up, and it was unanimously agreed that, to allow of greater freedom in discussion, engineers, managers, and assistant-managers only should be admitted as members.

The election of office-bearers resulted as follows:—

President.—Mr. W. R. Roberts, of Newtownards.
Vice-President.—Mr. W. Nesbit, of Ballymena.
Secretary and Treasurer.—Mr. J. Brodie, of Omagh.
Members of Committee.—Mr. T. Frizelle, of Holywood, Mr. R. Harrison, of Monaghan, and Mr. R. S. Henderson, of Larne.

The next meeting was arranged to be held at the latter end of February, and the annual general meeting at the latter end of June—three meetings only to be held annually.

An interesting impromptu discussion was raised by Mr. Roberts on the vexed subject of naphthalene, in which all present took part. The question of visiting the Earl's Court Gas Exhibition was brought forward, and as the members present stated their intention of doing so, it was suggested that, if possible, the Secretary should arrange to make up a party for the purpose.

The business concluded with a vote of thanks to the Chairman.

Next Year's Meeting of the Institution of Gas Engineers.—We are asked by Mr. Walter T. Dunn, the Secretary of the Institution, to announce that the Council decided last Tuesday that the annual general meeting next year shall be held in London, on Tuesday, the 30th of May, and following days; the occurrence of Whit Monday on the 12th of June rendering the usual date impracticable.

Proposed Memorial to the Late Mr. Willey.—A public meeting was held at Exeter last Tuesday to consider a form of memorial to the late Mr. Willey. The Mayor (Mr. F. J. Widgery), the Dean (the Bishop of Marlborough), the Chairman of the Chamber of Commerce, and others, delivered speeches eulogizing Mr. Willey's great business ability, his zeal for education, and his lavish distribution of money for public objects. The Dean said Mr. Willey was no mere pile-maker. He showed he had the power to earn money, but he also proved to demonstration that he valued it only for what it would do in advancing the public weal. It was decided to raise a fund in order to create a number of scholarships for the Manual School for boys which Mr. Willey founded and maintained as a means of turning out the most skilled craftsmen. The boys serve three years at the school before they enter the workshop as apprentices. It is hoped to raise a sum of £4000.

American Gaslight Association.—The 32nd annual meeting of the Association is being held this week at Washington (D.C.), under the presidency of Mr. Rollin Norris, of Philadelphia. The business will be transacted in the New Willard Hotel, and will be opened to-morrow morning. There are five papers down for discussion, their titles being as follows: "Generation of Steam by the Waste Heat from Water-Gas Sets," by Mr. Donald M'Donald, of Louisville; "Distributing Power Throughout a Gas-Works by Means of Electricity Generated at a Central Point," by Mr. W. A. Baehr, of St. Louis; "Oxide Purification," by Mr. E. H. Earnshaw, of Philadelphia; "Methods of Charging for Gas," by Mr. F. W. Frueauff, of Denver; and "Consumers' Meters," by Mr. B. H. Spangenberg, of Philadelphia. As Washington is a very interesting city, there will not be any entertainment to-morrow night (the members being left free); but there will be a banquet on Thursday evening, and on Friday a steamboat excursion to Mount Vernon.

RETORT-HOUSE PRACTICE IN SMALL WORKS.

At the Annual Meeting of the Michigan Gas Association, held at Jackson last month, a paper on the above subject was read by Mr. G. C. TURNER, the Secretary of the Coldwater (Mich.) Gas Company. The following are some extracts from it.

In the spring of 1895, the writer, fresh from a desk in a Chicago bank, secured a more or less responsible position with the Gas Company at Coldwater. In the retort-house he found in operation a bench of three diminutive retorts, the destiny of which was presided over by two aged and decrepit gentlemen who remained on duty twelve hours each and also ministered to the wants of two small purifying-boxes filled with lime. They felt capable of administering all branches of the business—office work, management, and distribution—in addition to their other duties, and accordingly resented being placed under the supervision of a youth of tender years, who had no knowledge of gas manufacture. The station meter for the previous year had registered 2 million cubic feet as the total gas made; and though the population of Coldwater is no greater now than then (about 6000), the gas made in 1903 amounted to 17,355,000 cubic feet. This year we hope to exceed 20 millions; but it is needless to say that the two old gentlemen have long since sought other fields of usefulness.

When the consumption had been worked up to a point where it was necessary to install two benches of fives (plain settings) in a new retort-house, the question as to the economy of low or high heats presented itself. By maintaining a high heat and charging every six hours, we obtain, with Youghiogheny coal and without enrichment, a yield of 5·2 cubic feet of gas (not corrected for temperature or barometer) per pound of coal carbonized. The average yield with a low heat is about 0·5 cubic foot less per pound. Assuming that with a low heat a bench will last 36 months, and with a high heat only 18 months (though in reality it will last longer), in operating two benches of fives the expense of renewals would be two-thirds the price of a bench-setting more per year for maintaining a high heat than a low one. The cost of the retorts, &c., and the labour of setting a bench of fives, is about $280; and two-thirds of this would, therefore, be $186·66. The carbonization of 3,470,000 lbs. of coal in our retort-house during the year 1903 would mean consequently 1,735,000 cubic feet more gas made than would have been obtained with low heats.

A test made at our works on the 9th of August of this year, showed that 300 lbs. of coke as fuel per ton of coal carbonized were required in running a bench of fives at full capacity at a low heat. The average quantity of fuel required to maintain a high heat is 364 lbs. of coke per ton of coal carbonized. The amount of fuel used during the year was really 55 tons greater than before, on account of keeping up high heats. Our coke netted us about $4·60 per ton at the yard last year; so we had the value of the coke ($253) added to the extra cost of bench renewals ($186·66), or a total of only $439·66 to offset the 1,735,000 cubic feet of gas. The fact must not be overlooked that low heats produce an inferior grade of coke, much less attractive to those who purchase it for domestic use. On this basis, preference has been given by us to high heats.

If the output of gas be such (say, 45,000 cubic feet a day) as to require all that could be made in a bench of fives and half as much as could be made in another, both run at high heats, it is desirable to know the most economical way of managing. In a test made on the 8th of August, a bench of fives was run for 24 hours at half capacity (ten 300-lb. charges) with a low heat. The charges were fully burned out, giving the same yield as with high heats; but the bench fuel used was 510 lbs. of coke per ton of coal carbonized. The comparison in economy between running for 24 hours two benches of fives with low heats at nearly full capacity and one at full capacity with high heat and the other at half capacity with low heat, would be as follows; the item of labour being the same in both cases, and the yield per pound of coal carbonized being considered (4·5 cubic feet in the one case and 5 cubic feet in the other):—

Two Benches of Fives with Low Heats.

Coal carbonized, 10,000 lbs. at $3 per ton	$15·00
Bench fuel, 300 lbs. of coke per ton of coal carbonized, 1500 lbs., at $4·60 per ton	3·45
Total	$18·45

One Bench of Fives at Full Capacity with High Heats, and one at Half Capacity with Low Heats.

Coal carbonized, 9000 lbs. at $3 per ton	$13·50
Bench fuel, 364 lbs. of coke per ton of coal carbonized in full capacity bench (1092 lbs.), and 510 lbs. in half capacity bench (765 lbs.), 1857 lbs., at $4·60 per ton	4·27
Extra cost for bench renewal for full capacity bench, 24 hours	0·26
Total	$18·03

By this method it will be seen that it is more economical, by 42 c. a day, or $153·30 a year, to operate the two benches in the latter manner, besides securing a more desirable grade of coke.

It has been aptly said that the profits of a gas company are made or lost in the retort-house; and this is just as true of a small company as of a large one. One drawback in operating a works of the size described in this paper is that the plant is not large enough to justify paying a foreman to overlook the retort-house work; but it is so large and has such claims on the time of a manager that it is impossible for him to give this branch of the business constant personal attention. The alternative seems to be to hire the best stokers you can get, stimulate their interest in the work, and arouse a friendly rivalry as to gas made and yield per pound of coal carbonized at the beginning of the run, and they will watch the results each day with the keenest interest. It might seem that this would lead to heavier charges being thrown in than were reported; but when the next stoker began to draw them, he would notice if they were larger than they should be, especially if the preceding stoker had made a good showing, though each would have a chance to put in charges 25 lbs. or 50 lbs. heavier than reported on the first part of a run, possibly without detection. However, we have found no other plan which seemed better. Though from four to five hours are usually considered sufficient time in which to work off a charge, we fill our retorts only once in six hours, in which time all the gas that can possibly be extracted from the coal is obtained, as well as a most excellent quality of coke.

The following three tests were made on the 27th, 28th, and 29th of July last; the quantity of coal carbonized per 24 hours being 6000 lbs.:—

—	Coke Drawn.	Coke Used for Fuel.	Gas Made per Pound of Coal Carbonized (Uncorrected).	Coal Carbonized Drawn Out as Coke.	Coke Drawn Used for Fuel.	Bench Fuel Used per Ton of Coal Carbonized.
	Lbs.	Lbs.	Cub. Ft.	Per Ct.	Per Ct.	Lbs.
Bench of fives in use 10 days	4150	1210	5·19	69 16	29·15	403
Do. in use 20 months	3955	1060	5·21	65·92	26·80	353
Do. in use 11 months	4045	1045	5·20	67·41	25·83	338

During the past eight months of this year, we have made, on an average, 55,000 cubic feet of gas per day; and the cost of retort-house labour has been 9·3 c. per 1000 cubic feet of gas put into the holder. These figures are obtained by adding to the wages of the stokers and their helper the cost of an hour's time of the street foreman each day, which is more than he really gives. No extra labour is employed about the retort-house. Our force there consists of two stokers and one helper. The stokers are on duty twelve hours each—one working from midnight until noon, and the other from noon until midnight—while the helper assists them from six in the morning until six at night, working with each stoker for half of his turn. The fires are "broken down" every two or three hours; and the clinkering is done at ten o'clock in the forenoon and four in the afternoon, so that the third man can help. Fires are not allowed to die down before clinkering, but are always at white heat. This makes it pretty hot for the men; but clinkers on the sides of the fire-box and on the grate-bars can be got off more easily, and the work can be done much quicker, while the cooling down of the bench is prevented. In building a fire, allowance is made for the fact that there is more heat in the back of a fire-box than in front; and the coke is heaped a little higher at the back, sloping gradually towards the door. When the fire has practically burned down, the top surface of the bed of fuel is level, and there are no depressions or dark spots at the back to lower the temperature of the bench by allowing cold air to pass up through these thin layers of coke. The grate-bars are jarred every half-hour, to cause the ashes and small clinkers to drop into the ashpit; the steam arising from their contact with the water which is constantly kept there materially helping the fire and softening the clinkers in the fire-box. Stand-pipes are cleaned before each charge is made; one of the implements used being a flexible iron rod with a chisel and hook at one end—the chisel cutting obstructions off when the rod is pushed upwards, and the hook doing the same kind of work when the rod is drawn downwards.

We have never tried soft coal as a fuel, as our works, being without any water-gas plant as an adjunct, are liable to cause nuisance. The advantage would seem to be in the use of coke, however, as a more even heat can be maintained and the flues stop up much less frequently. One other reason should also favour coke, and that is that in small towns of stationary population the great increase in the sale of gas, and consequently in the production of coke, has considerably exceeded the demand for the latter as a domestic fuel. It would, therefore, be impossible to find a sale at a fair price for the entire output of coke if a portion were not used for firing. If some practical method could be devised for the use of the tar bye-product, either in firing or in making gas, which would eliminate the troubles, such as the filling up of flues, &c., it might be a valuable help.

Small gas-works running at nearly full capacity and without water-gas plant as an adjunct are liable to experience numerous difficulties in the course of a year. In the summer, there may be nearly a week of very dark and hot days, when every gas-stove and all the lights are in use, making a very sudden and unexpected increase in consumption, of which there has not been enough warning to allow of the starting of a new bench, even if the extra expense did not preclude it. Many towns also have a carnival week in August or September, in which the consumption

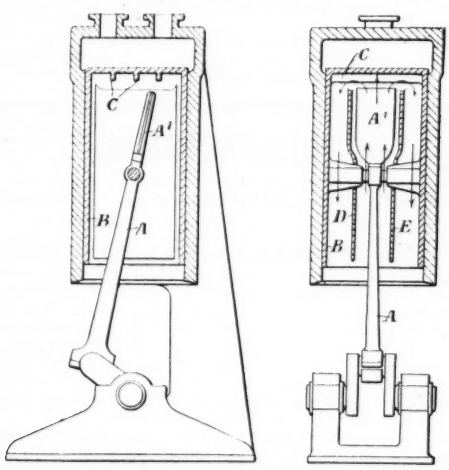
increases one-third during the week; and there is always a very large rise for two weeks during the holidays. Although sufficient warning is given beforehand to prepare for the last two contingencies, no one wishes to incur the additional expense of firing a new bench for so short a time only to have to abandon it again in a few days. A device which is well suited for just such emergencies as these is fully described by Mr. Frederick Egner in the "Question Box" of the Ohio Gaslight Association.* By its use oil gas can be made in one of the coal-gas retorts in such quantity as greatly to swell the daily output. We have no trouble in making 15,000 to 20,000 cubic feet of gas in 24 hours with one retort; and we have been helped out of many a difficulty thereby.

Though it may have nothing to do with the manufacture of gas, nevertheless an appearance of neatness round a retort-house is at all times desirable. It attests to thorough and careful work, and cannot fail to exert a helpful influence over the men employed therein. At its best, the retort-house has anything but a clean and inviting appearance; but if, after the charges are drawn, the charging-floor is always carefully swept free of dust and accumulations of soot, if each tool is in its proper place instead of all the tools being scattered over the floor, if the exhauster and other apparatus are properly wiped and cared for, all concerned will have the satisfaction of knowing that, like the widow who contributed her mite, "they have done what they could."

REGISTER OF PATENTS.

Cooling Devices for Gas-Engines.—Reichenbach, F., of Charlottenburg, Germany. No. 20,387; Sept. 22, 1903.

The patentee claims that it is possible to cool the bottom of the piston of a gas-engine (in order to obviate premature ignitions) by providing, on the extremity of the connecting rod A, a fan or vane like prolongation A^1, which, by its movement, corresponding with the displacement of the connecting rod, fans or drives cold air against the cylinder end. According as the crank is ascending or descending—that is to say, according as it is situated to the right or left hand—the



vane or the like is at the left or right hand in the piston B (continuously effecting a fan-like movement). In order that the piston end may afford a sufficient surface for the air blown upon it by the fan, cooling ribs C are provided upon the piston end; and in order to produce lateral discharge of the air, partitions D and E are arranged upon both sides of it approximately for the whole length of the piston. The air entering from below at the centre and driven by the fan against the piston bottom, is deflected therefrom and escapes (as shown by the arrows) through the passages formed by the partitions D E and the periphery of the piston.

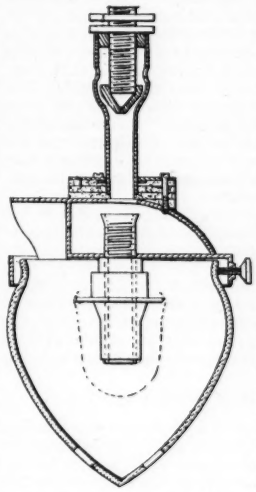
Overhead Regenerative Gas-Lamps.—Welch, W. H. I., of Bow, E. No. 25,384; Nov. 20, 1903.

This invention relates to patent No. 16,626 of 1900; the object being to simplify the construction and to provide for the more efficient and perfect working of the lamp.

For this purpose, the central chimney is cast in one piece with an external dome-shaped vessel; the lower end of the chimney being formed with a bell-shaped or coned mouth. The lower edge of the cone or mouth extends outwards until it meets (or nearly meets) a rim above it, forming the outermost lower side of the external vessel. This outermost side is also cast with an upwardly and outwardly extending piece, which forms a flange by which the whole casting can be supported by the lamp casing. The vessel is provided with holes for the admission of air at the top or sides of the dome, which air "becomes highly heated by its intimate contact with the exterior of the chimney cone." The outer downwardly projecting rim of the outer vessel is cast with holes in it, or has attached to it a strip of metal cut to wave-form at its lower edge; and other holes are provided at suitable places for the admission of air to keep the upper part of the lamp cool.

* The volume bearing this title was noticed in Vol. LXXXVI. of the "JOURNAL."

Inverted Incandescent Gas-Burners.—Reiss, C., of Berlin. No. 22,886; Oct. 22, 1903.



This invention in inverted incandescent gas-burners has for its object to prevent the re-entering of the gases of combustion into the burner and the heating of the space from which air is drawn into the mixing-tube of the burner, "whereby a sooting and a smelling of the flame is avoided, as always air containing a sufficient quantity of oxygen enters the mixing-tube."

Inverted incandescent gas-lamps have become known (the patentee remarks) in which a re-entering of the gases of combustion into the burner is avoided by means of a chimney which surrounds the gas-mixing tube of the burner and discharges the gases of combustion above those openings through which air enters the mixing-tube. By such a device re-entry of the gases of combustion is avoided, but it is not prevented that the space from which air is drawn into the mixing-tube of the burner is heated. "The air entering into the mixing-tube therefore is thin, and does not contain a sufficient quantity of oxygen. Furthermore, the air-mixing tube is heated so that the gas entering from the gas-pipe is expanded and does not easily flow down in the tubes to the burner opening."

These disadvantages are said to be avoided in the lamp here described, by covering the lamp-globe at the top above the burner, but providing only at one side an exit through which the gases of combustion flow out. The exit may be so devised that the rising gases are deflected and laterally flow out nearly in a horizontal direction to the side of the lamp opposite to which the gas-arm leads to the lamp. The exit gases do not therefore meet the gas-arm and heat the gas contained in it, whereby fluctuations in the gas pressure would cause an irregular burning of the flame. The gas would not easily flow down in the burner and draw in a sufficient quantity of air. The heating of the mixing-tube and of the gas contained in it can further be prevented by arranging a cooling chamber directly above the burner, or by providing an interruption between the burner-tube and the mixing-tube, so that no heat can pass over from these parts to the mixing-tube.

Gas Blow-Pipes.—Fouché, E., of Paris. No. 27,175; Dec. 11, 1903.

This is a modification of patent No. 6944 of 1903. The inventor finds that the front portion of the blow-pipe, at the extremity of which is the flame, acquires such a high temperature that it is liable to light-back. In order to prevent this, he cools the front portion by means of longitudinal ribs, which project from the outer surface. This arrangement considerably increases the external metallic surface of the nozzle of the blowpipe, in such a manner that the outer air in contact with the wall, or the cooling gas circulating in the chamber surrounding the nozzle of the blow-pipe, is able to absorb a larger quantity of heat, and so the blow-pipe nozzle is more effectively cooled.

Bending Metallic Sockets for Gas and Water Pipes.—Guy, F. C., of Wednesbury, No. 28,387; Dec. 24, 1903.

This machinery for bending metallic sockets for connecting gas and water pipes consists essentially of a reciprocating mandrel on which the socket is bent when the mandrel is at rest by a set of three bending tools—one tool working vertically over the mandrel and the others having a horizontal sliding motion, and operating on opposite sides of the mandrel; the tools and mandrel having motion imparted to them by suitable mechanism.

Purifying Illuminating Gas.—Boult, A. J.; a communication from C. S. Lomax, of Everett, Mass., U.S.A. No. 14,445; June 27, 1904.

This method of purifying illuminating gas "contemplates the removal of carbon disulphide in a cheap and economical manner—preferably with existing apparatus and with the aid of inexpensive materials." The reaction between carbon disulphide and amines is availed of to remove the carbon disulphide from the illuminating gas; and the patentee remarks that perhaps the most important feature of the invention is the discovery that "this reaction may be carried on on a commercial scale by chemically divided sulphur as the catalytic or contact substance."

The present method of purifying illuminating gas, he points out, consists in the removal of carbon disulphide by the use of the carbon disulphide and amine reaction in the presence of chemically divided sulphur. The gas from the generators or retorts, after having been cooled and scrubbed free of its content of tar and ammonia, is passed through a purifying-box, such as is ordinarily used in gas-works, which contains chemically divided sulphur impregnated with an amine. The preferred form in which the sulphur is used is as "iron sponge," which is employed for removing sulphuretted hydrogen from gas. But it may be remarked that the invention also contemplates the use of bog iron ore, Weldon mud, Lux's mass (a mixture of oxide of iron with wood shavings and soda), Laming's mass, spent lime, or the mixtures of these materials with wood shavings, sawdust, coke, breeze, and other materials used for increasing the porosity of the material, "which materials have been commonly used for the removal of sulphuretted hydrogen from gas, and are therefore, after use, rich in free chemically divided sulphur."

As is well known, he proceeds, the removal of sulphuretted hydrogen

from gas is accomplished by the use of ferric hydroxide in a purifying-box through which the gas is passed; the ferric hydroxide reacting with the sulphuretted hydrogen to form iron sulphide and water. This sulphide of iron is revivified for repeated use by oxidation (by exposure to the air or oxygen), which transforms the sulphide into free chemically divided sulphur and ferric oxide or hydroxide. The iron sponge is used over and over again, with revivifications between, until it is useless for further removal of sulphuretted hydrogen. At this time, the "spent oxide" is heavily charged with very finely divided free sulphur, which exists in a chemically divided state—as much as 40 to 60 per cent. of the spent oxide being free sulphur. By reason of the fact that this spent oxide is composed so largely of sulphur, and the sulphur is in such a finely divided state, it exposes an enormous surface of sulphur, and is the best catalytic substance for use in the present method of which the applicant is aware.

Of course, it is to be understood that the present invention is not limited to the use of spent oxide as the catalytic or contact substance of the reaction, but contemplates, in its broader aspects, any form of chemically divided sulphur which the user may desire to employ. The purifying-box, therefore, is preferably filled with the spent oxide which is impregnated with an amine, or amines (preferably commercial aniline) which, in the presence of the sulphur, reacts vigorously with the carbon disulphide contained in the gas passing through it to form sulpho-carb-anilide and sulphuretted hydrogen; the reaction being as follows:—

$$2C_6H_5NH_2 + CS_2 + S = CS(C_6H_5NH)_2 + H_2 + S$$

It is to be noted that the sulphur which is included in the reaction enters only as a catalytic or contact substance and is not affected by the reaction which it promotes. If desired, the aniline used for impregnating the spent oxide may be mixed with a suitable neutral solvent or diluent in order to form a vehicle for spreading the same over the surface of the sulphur.

When the purifier containing the spent oxide and aniline has been used until the aniline is exhausted by the reaction, the purifying-box is put out of operation, and the exhausted material is replaced with spent oxide freshly impregnated with aniline. The material is deprived by the reaction of its aniline only; and in order to prepare it for further use it is only necessary to again impregnate it with the aniline solution. The same spent oxide may be used many times.

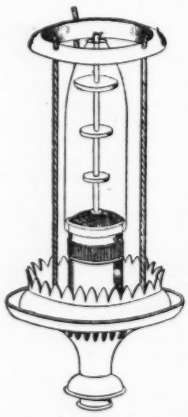
After the gas has been deprived of its carbon disulphide in the purifying-box in the manner just referred to, it is passed through an ordinary purifying box or boxes containing ferric hydroxide or other material for the removal of sulphuretted hydrogen, after which the gas may be conveyed away and stored.

It will be observed that the method renders unnecessary the removal of the carbonic acid from the gas—thus eliminating an expensive step which is necessary in the lime method for the removal of carbon disulphide. The reaction of the carbon disulphide with the aniline in the presence of such a great sulphur surface is so vigorous and rapid that in practice it will be necessary, in order to reduce the amount of organic sulphur compounds in the gas below the permissible or hygienic limit, to pass only part of the gas through the sulphur-aniline purifying-box; the remainder of the gas being permitted to pass by and be mixed with the gas from the box, so that the mixture shall contain only the permissible amount of sulphur in compounds other than sulphuretted hydrogen. This is a feature of the invention said to be of considerable practical value, as it materially diminishes the volume of gas necessary to be treated by the process and at the same time produces a product sufficiently free from organic sulphur compounds.

The process as preferably carried on is a dry process and not a wet one. This important feature of the invention, it is claimed, commends it over prior attempts to employ the amine reaction by reason of the elimination of specially designed and expensive scrubbers for washing and re-carburetting the gas for the restoration of lost illuminants.

Incandescent Mantle Burners.—Cox, H. B., of Washington, D.C., U.S.A. No. 14,488; June 27, 1904.

It is an object of this invention to increase the candle power or efficiency of incandescent mantle burners, by directing or deflecting the burning mixture radially or laterally against, or adjacent to, the surrounding or annular wall of the mantle, and by so breaking up and spreading or deflecting the burning mixture within the mantle as to locate the points of most intense heat or combustion adjacent to such portions of the mantle as will produce a very high efficiency of illuminating power, a thorough mixture and commingling of the ingredients of the combustible mixture, "to produce more perfect combustion, and to cause a radial diffusion of more intense light rays from the mantle."



A perspective view is given of a portion of an ordinary incandescent mantle or Welsbach burner showing the invention applied thereto. Within the vertically elongated combustion space or chamber enclosed by the mantle, one or more bodies are arranged "to spread, break up, and deflect the combustible mixture." For instance, a central vertical rod may extend longitudinally throughout the length of the mantle, and on it are arranged one or more discs, transversely spanning, or partially spanning, the combustion chamber enclosed by the mantle. The discs are about equally spaced apart, and of different diameters—that is, the lowest disc is of comparatively small diameter, the next disc above of greater diameter, and the top one of the greatest diameter—leaving a comparatively narrow space between its periphery and the inner surface of the mantle. The discs (made of any suitable material to form deflectors or spreaders) break up the heat column within the mantle and deflect the combustible mixture radially or laterally toward the mantle, and so force the burning mixture outwardly from the centre line of the combustion chamber, "causing the most intense combustion to take place around the inner surface of the mantle."

High-Candle Power Incandescent Gas-Lamps.—Stevens, J. H., and Jones, H. A. (Pond and Co.), of Farringdon Street, E.C. No. 4267; Feb. 20, 1904.

This invention relates to an incandescent gas arc lamp combining a twin burner fed from a single mixing-chamber, a globe carrier with bayonet catch, a shutter for regulating the air supply to the mixing-chamber, and a regulating gas-nipple with the means of readily converting the same from an indoor lamp to one suitable for outdoor lighting. It is a modification of the well-known "Wis" lamp, as referred to in the "JOURNAL" for Sept. 6 (p. 666).

APPLICATIONS FOR LETTERS PATENT.

21,181.—KNOPF, A., and MINDSENT, B., "Inverted incandescent gas-lamps." Oct. 3.
21,236.—WOLFSON, J., "Incandescent intensifier." Oct. 4.
21,279.—TATTERSALL, H., "Improvements in or relating to incandescent lamps." Oct. 4.
21,291.—THOMSON, J., "Water-meters." Oct. 4.
21,316.—CUTLER, S., JUN., "Purifier grids." Oct. 4.
21,317.—PAYENS, L. A., "Making water-gas." Oct. 4.
21,318.—NEUMAN, F., "Generators for water gas and producer gas." Oct. 4.
21,320.—FULLAGAR, H. F., "Regenerative internal combustion engines." Oct. 4.
21,408.—PERRIER, A., "Production of gas." Oct. 5.
21,429.—WEBB, W. H., BRETTELL, W. G., and ADAMSON, A J., "Gas-compressors." Oct. 6.
21,442.—HEIMANN, F., and the GES. FÜR HÄNGENDES GASGLÜHLICHT M. B. H., "Inverted incandescent gas-lamp." Oct. 6.
21,488.—LAKE, H. H, "Burners." A communication from B. E. Jackson. Oct. 6.
21,501.—JOHNSON, J. W., "Valves for gas." Oct. 7.
21,607.—SMITH, T. B, and the SUNLIGHT AND SAFETY LAMP COMPANY, LTD., "Dust retainer for gas pipes and fittings." Oct. 8.
21,655.—M'KINLAY, R., "Discharging retorts." Oct. 8.
21,663.—FULLAGAR, H. F., and BOTTOMLEY, J. F., "Gas-turbines." Oct. 8.
21,667.—HUSSEY, J., "Gas-mantles." Oct. 8.
21,668.—THOMPSON, W. P., "Pumps." A communication from Missionsdruckerei Gesellschaft m. b. H. Oct. 8.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Irish Gas Managers at the Earl's Court Exhibition.

SIR,—May I through your columns address a few words to the members of the Irish Association? Two parties of gas managers are coming across to attend the Earl's Court Exhibition. The first party will spend the 29th and 30th of November and the 1st of December in London, and the second the 11th, 12th, and 13th of December. Other Irish managers would probably care to attend at the same time, and so meet friends. I should be very pleased, as Vice-President of the Association, to welcome them, and allow them to use my offices as a *rendezvous*, and have their letters addressed there.

Should any manager wish to know who comprise each party, a post-card sent to me would elicit the desired information; and to facilitate my giving this, I should be pleased if members fixing on any of these dates would advise me.

5, *Westminster Chambers, S.W., Oct.* 11, 1904. R. BRUCE ANDERSON.

Telescopic Rams for Pushing-Out Coke from Retorts.

SIR,—With reference to Mr. Bell's contribution in the last number of the "JOURNAL" on the above matter, I note that he mentions the fact that his Board accepted a tender for a De Brouwer patent discharging machine in December last. This, however, does not affect the point at issue, for the reason mentioned in my first letter—that the De Brouwer patent does not show or claim the combination of a chain and telescopic ram.

It is rather significant that the essential feature of this so-called De Brouwer patent apparatus is not patented by Mr. De Brouwer or by Messrs. Jenkins and Co.

The point emphasized, however, by Mr. Bell—that the "essential feature" of the machine described in his paper in June last, and which he has had working for four months past, is a chain in combination with a telescopic ram—is all-important, inasmuch as this special combination is the "essential feature" of my patent; and the fact that Mr. Bell described this combination in June last, and has had the machine working for four months, does not exonerate him or the makers from infringement of my patent.

Manchester, Oct. 14, 1904. JOHN WEST.

Cheap Conversion of Flat-Flame to Incandescent Lamps.

SIR,—I have just had an experience which has been so remarkable that I should like to ask if it has been repeated in any other locality.

Our lighting authority having gone in for electric lamps, with what I take to be the usual unsatisfactory result, I was asked what I could do with incandescent gas. I thereupon had about four dozen lanterns of a type which are freely advertised fixed in as good positions as

possible. The light obtained gave every satisfaction; but when it came to a question of applying the principle to a large number of existing lamps, the cost was prohibitive. I may say that, judging from what I had seen and heard, the system I adopted was a wind-proof and strongly-made lantern.

After a while, the electric light being even less satisfactory, the authorities started experiments on their own account, and fixed four or five dozen cheap burners in the existing lanterns. Although these lanterns are glazed without putty, and are partly open at the bottom, there is no doubt that the result up till now has been very satisfactory; some of the lamps having been fixed for upwards of six months. It stands to reason that if the street lighting in a district can be altered successfully from the flat-flame to the incandescent system at a cost of a few shillings per lamp, the situation is even stronger than it was thought to be.

Oct. 13, 1904. INSPECTOR.

The Merits of Carburetted Water Gas.

SIR,—In order to reply to the first point of the letter in your last issue on the above subject, I have to assume a wholly imaginary disability, existing only in the mind of your contributor, who is apparently innocent of any practical experience in this regard.

He again implies the unsatisfactory character of incandescent lighting with a mixture of coal and carburetted water gas. A fallacy reiterated is none the less a fallacy. I repeat that the whole of the Gaslight and Coke Company's area is lit by such a mixture; the Western, Northern, and Eastern suburbs of London are similarly supplied; by far the greater number of the larger cities in the kingdom are so lit; so are practically all the health and pleasure resorts in this country, and, in addition thereto, a very large number of small provincial towns. Is it conceivable to any sane person that the distribution of this class of gas, under such comprehensive and diversified conditions, and over a number of years, could fail to disclose the difficulty that your contributor is pleased to imagine as a necessary evil? I did not refer to "this or that" piece of lighting. I referred to the whole of the lighting under these conditions, which in this country, at the present day, leaves the lighting on any other basis in a minor proportion of importance.

Passing to the question of calorific values, the fact that your contributor adopts the candle power as a scale in the estimation of such values, shows once more that he has little practical experience in relation to the question. To show the absurdity of this method of reckoning, uncarburetted water gas without any appreciable candle power has a calorific value of 320 B.T.U. Therefore, when carburetted to the extent of 1-candle power, this gas would have a calorific value of over 320 B.T.U. *per candle*, as compared with about 40 B.T.U. per candle of normal London gas, and yet have only about one-half the calorific value of the latter!

A further application of this method of calculation to the actual figures referred to discloses its utter futility, by producing conclusions absolutely opposed to your contributor's arguments. If the gas supplied by the Gaslight and Coke Company in this instance had been coal gas only, then assuming the same number of B.T.U. per candle as in the case of the South Metropolitan Company's coal gas, its calorific value must have been 15·68 × 41·6, or 652·3 B.T.U. per cubic foot. Therefore the 10 per cent. of carburetted water gas in the mixture must be responsible for the difference in calorific power between 652·3 and 616·2 as tested—namely, a deficit of 36·1 B.T.U. per cubic foot. To accomplish this, the carburetted water gas in the mixture must have had a calorific value as low as 291·3 B.T.U. per cubic foot. This is absurd, because the latter is a lower value than that of uncarburetted water gas, and the carburetted water gas present was there partly by way of enrichment.

The object in this departure from the standard of B.T.U. per cubic foot is obvious, for your contributor does not hesitate to suggest, by his resort to this absurd method of computation, that the gas supplied by the Gaslight and Coke Company, as referred to by Mr. Boys in his evidence, had a lower calorific value than that of the South Metropolitan Company; whereas it is clearly stated in the evidence adduced that the calorific power of the last-named Company's gas was 610·4 B.T.U. per cubic foot (Question 3104), while those of the Gaslight and Coke Company (Question 3121) and Commercial Gas Company (Question 3118) were each 616·2 B.T.U. per cubic foot—showing the South Metropolitan Company's gas to be of a comparatively lower calorific value. Your contributor further omits to state that the candle power of the Gaslight and Coke Company's gas on this particular occasion was only just over 15½ candles, or nearly 1 candle short of its normal quality. It is just as well to be straightforward in such matters.

Again, examining this particular evidence more closely, we find, on p. 205, that the gas tested as supplied by the Commercial Gas Company had 23·8 per cent. of carburetted water gas in it; and in Question 3118 of the report, it is stated that the calorific power was 616·2 B.T.U. The Gaslight and Coke Company's gas, of a slightly higher candle power, in the same table is described as having 10·1 per cent. of carburetted water gas, and in Question 3121 the calorific value is returned as 616·2, or precisely the same calorific power as the gas of a lower illuminating power, with 13 per cent. more carburetted water gas in it. Where is your contributor's case, on the evidence that he himself tenders?

The following tabular statement from Mr. C. V. Boys' evidence will support my references:—

Name of Company Supplying Gas Tested.	Gross Calorific Power B.T.U.	Average Illuminating Power.	Percentage of Carburetted Water-Gas Present.	B.T.U. per Candle.
	Per Cub. Ft.			
South Metropolitan Co.	610·4	14·65	0	41·6
Gaslight and Coke Co.	616·2	15·68	10·1	39·3
Commercial Gas Co. .	616·2	15·49	23·8	39·8

It will be noted that the calorific values in this table are gross values. This and other recent evidence render it extremely questionable if the small theoretical difference between the calorific values of carburetted water gas and coal gas is sustained upon the net or practical basis by which the consumer is alone affected.

With regard to the question of coal and coke, your contributor still attempts to defend a position that has been definitely abandoned by Sir George Livesey, both in his evidence as cited by me and in his letter with relation to the Nottingham gas supply as published in your last issue.

With regard to the fall in the price of coke, my attribution of this fall in price to the policy of the South Metropolitan Gas Company is not a matter of inference, deduction, or argument, but a statement of fact. When the Gaslight and Coke Company recently offered their coke at 12s. per ton to contractors, in consistent relation to the other Companies producing carburetted water gas, the South Metropolitan Gas Company simultaneously offered theirs at 10s. 2d. per ton. It now remains to the former Companies to come down to the South Metropolitan Gas Company's price, or turn their coke into gas through the medium of carburetted water-gas plant. It is, therefore, to the exclusive manufacture of coal gas that the fall in the price of Metropolitan and Suburban coke, with its attendant financial losses, is directly attributable.

It is amusing in the last paragraph of your contributor's communication to find the suggestion that the South Metropolitan Gas Company can be considered as one uninfluenced by the manufacture of carburetted water gas. This Company is practically isolated in the midst of companies which have adopted the dual system of manufacture; and it has been buying its coal in a market which, its own Chairman admits, has been influenced in its favour by this policy of its immediate neighbours, and has been selling its coke in a market which has similarly and admittedly been established by a policy contrary to its own. In view of these facts, I say its prosperity is not its own creation, but is due to technical principles to which it is in avowed opposition. Now it has taken the first step to destroy the advantageous conditions established by its technical opponents, and from which it benefited so largely.

Mr. Cotton's statement can be taken to deal with the nebulous arguments in the penultimate paragraph of your contributor's letter.

Passing to a still more important subject, Mr. Cash is not alone in noting the hostile tone of your recent leading article upon the fatality at Brighton. It is now over six years since an exhaustive Governmental Inquiry was held upon the subject of carburetted water gas. At the time that inquisition was held, the use of carburetted water gas was on a scale of less than one-half of its present dimensions. If there had been a scintilla of justification attaching to the demand for a limitation of carburetted water gas, is it not patent to any reasonable mind that the vast extension of the use of carburetted water gas day by day and year by year, through all the most populous centres in this country, must have revealed increased reasons for such a limitation? The fact remains that the Government has taken no action in this matter in the absence of the necessary evidence. You, yourself, in your note admit that the influence of such an incident is not "legitimate," and that it can only tend through "ignorance" to affect the case. If so, what justification can there be for the antagonistic tone of your article, and the suggestion of a limitation which the Government, in its impartial position, has declined to impose.

If this stale and empirical agitation, which has been dissipated by sustained experience in this and other countries, cannot obtain the impartial countenance of Governmental authority, is its resuscitation by a publication affecting to represent gas interests legitimate? Such an article as yours must impair the confidence in your representation of their interests of those responsibly administrating the more important order of gas undertakings.

4, *Brick Court, Middle Temple, E.C., Oct.* 14, 1904. A. M. PADDON.

St. Ives Water Supply.—A report was presented to the St. Ives, Cornwall, Town Council last Monday with reference to an arrangement which had been made between the Water Committee and Mr. E. Hain, M.P., for improving the water supply. Mr. Hain offered to the Corporation a lease for 999 years of various lands and water rights in return for certain exchanges of land and the payment of a yearly acknowledgment rent of 10s. Alderman Pearce, the Chairman of the Water Committee, said Mr. Hain had acted very generously with the Corporation, and the arrangement ensured them the possession of a permanent and pure water supply which it was impossible to contaminate. Though it might cost the town something to pump the water at times, they would always have enough. It was decided to accept Mr. Hain's offer; and the Town Clerk was thereupon instructed to prepare the necessary legal documents in order to give effect to the arrangement.

Swansea Gas Company.—The half-yearly general meeting of this Company was held last Friday—Mr. T. T. Wood in the chair. The report of the Directors showed a net profit of £10,259 for the six months. The sum of £5445 was brought forward, making £15,704 available for distribution. The Directors recommended the payment of the usual dividend at the rate of 5 per cent. per annum, with a carry-forward of £8279. The Chairman, in moving the adoption of the report, said that in May last notices were issued that a reduction of 2d. per 1000 cubic feet would take effect from the 1st of July. This brought the price down to 2s. 10d., which, compared with other towns, showed it to be a reasonable figure for the excellent quality of gas the Company supplied. The consumption showed a rise of 12 per cent., and there were indications that the increase would continue. The first installation of inclined retorts had given satisfaction, and the second was being carried out. The number of consumers was now 12,915; and there were 6304 cooking-stoves in use. This was a large increase on the previous half year. The usual resolutions for the adoption of the report and accounts and payment of dividend were passed; and a vote of thanks to the Chairman terminated the meeting.

LEGAL INTELLIGENCE.

HARWICH BOROUGH BENCH.—Tuesday, Oct. 11.

(*Before Mr.* R. HILL, *the Mayor, Chairman, and other Magistrates.*)

Disputed Water-Rate—Annual Value Question Again.

To-day, Mr. Thomas Sutcliffe, of Merton Villas, Dovercourt, was summoned by the Tendring Hundred Water Company for neglecting to pay for water supplied by them to his premises at his request.

Mr. THOMPSON SMITH appeared for the Company; Mr. H. B. SUTTHERY represented the defendant.

Mr. THOMPSON SMITH said he appeared in support of a summons for the recovery of 14s., a quarter's water-rate due up to the 25th of December next, and 10s. 6d. arrears. The facts were not in dispute, and the only question the Bench had to decide was how the water-rate was to be assessed. Under the Company's Special Act, they were empowered to charge the sum of 10s. where the annual rack-rent or value of the premises supplied did not exceed £5, and the sum of 46s. where it was above £25 but not higher than £30. His contention was that the value of the defendant's premises for the purposes of the water-rate was between £25 and £30. He admitted that the assessment for the purposes of the poor-rate was £24; but the gross estimated rental was £30, and it was upon this basis that the water-rate was made. A similar case to the present, in which the question of annual value was determined, was that of *Stevens v. Barnet District Gas and Water Company*. By a Special Act obtained by that Company, they were to supply water at certain rates on the annual rack-rent of the house, if it was let at a rack-rent, and on the annual value if it was not. The Court in that case held that, inasmuch as it could not have been the intention of the Legislature to lay down two scales of charge, one for tenants of premises and the other for owners occupying their own houses, the words "annual value" must be treated as being equivalent to "annual rack-rent," and that an owner occupying his own house must pay water-rates upon the gross estimated rental. His point was that there was practically no substantial difference between the Tendring Hundred Water Company's Special Act and that of the Barnet Company—in fact, the wording of the two was identical.

Mr. SUTTHERY said the dispute was as to whether the water-rate was to be based upon the gross or the rateable value of the property supplied. If the Company charged on the gross value, they were doing so on too high a scale.

Mr. A. J. H. WARD, the Magistrates' Clerk, elicited that the parties were agreed that the full annual value or gross estimated rental of the premises was £30, and that the rateable value was £24; further, that, subject to the decision of the Bench as to the basis upon which the rate was to be made, the quarter's water-rate was due in respect of the premises to Christmas, together with arrears for several quarters.

Mr. SUTTHERY said if the Court held that the rateable value was the basis for the assessment of the water-rate, then the defendant had nothing except the current rate to pay. He submitted that in the case cited on behalf of the Company the question as to what was the meaning of rack-rent as compared with annual value did not arise, and consequently was never argued. He also urged that there was a clear and absolute distinction between the present case and the one cited. He then proceeded to review the various statutes dealing with the question of water-rates, in order to show on what value they were to be levied. The most important of all was, he said, the Public Health Act of 1875, which actually gave the definition of what was the meaning of rack-rent in connection with making water-rates. Rack-rent was defined as meaning rateable value; and this must be accepted in the reading of the Tendring Hundred Company's Act, which said that the water-rate was to be levied on the "rack-rent or value." Surely, if this was anything, it was ambiguous. When were the Company to collect on the rack-rent and when on the value, if there was to be a difference? When an Act of Parliament contained an ambiguity, if it meant that a company had the right to charge more or less, the ambiguity was to be decided in favour of the consumer. He submitted that the rate should be based on the rateable value of the premises.

Mr. THOMPSON SMITH contended that the Public Health Act did not apply to a Special Act, and that therefore the definition referred to did not hold good in the present case.

The CHAIRMAN said the Bench were not unanimous in their decision, which they had come to after much hesitation. Their view was that they were bound by the decision in the Barnet case, and that the words "rack-rent or value" in section 46 of the Tendring Hundred Water Act, 1884, meant the full annual value or gross estimated rental.

Mr. SUTTHERY said Mr. Sutcliffe was in Jersey; but he formally asked leave to appeal, in the event of his client deciding upon this course.

Conviction for Stealing from a Gas-Meter.

At the County of London Sessions last Wednesday, before Mr. M'Connell, K.C., John Mann, an engineer, was indicted for having stolen £3 7s., the moneys of the Brentford Gas Company. Mr. Leycester appeared for the prosecution. The prisoner had a workshop for repairing motor-cars at Bulwer Street, Shepherd's Bush, where he was supplied with gas through a prepayment meter. On the 25th of July, one of the Company's collectors called, and found that the meter had been opened with a false key, and the money which should have been in it was gone. The prisoner said he suspected one of his workmen, and asked the collector to call again. But a few days afterwards he left his house, and nothing more was heard of him until the 12th of September, when he was arrested on another charge. He then admitted that he had received the money. He was found guilty. Mr. Leycester said there was another indictment against him for stealing a motor-car and a coat, worth £150, but it would not be necessary to try him for that. Accused was sentenced to four months' imprisonment in the second division.

A Compensation Case at Edmonton.

At the Edmonton County Court, on Monday of last week, Judge Tindal Atkinson was asked to make an award in favour of Mrs. Kitchener, the widow of a labourer who was alleged to have died as the result of a slight injury sustained while in the employ of the Tottenham and Edmonton Gas Company. The applicant's case was that on May 16 her husband was one of a gang of workmen who were engaged in breaking up some concrete foundations at the Company's works at Edmonton. At a time when he and another man named Hamilton were alone, a piece of concrete which was chipped off while a wedge was being driven into the material flew off and hit him on the shin. He commented on the fact to Hamilton, but did not take much notice of it at the time, as only a small abrasion was caused. He continued at his work, and also went the next day, though not feeling very well. The day after the accident he visited Dr. Rostant, and an antiseptic lotion was applied to his leg. Next day he complained of being ill; and early the following week Dr. Fraser (the Parish Doctor) was called in to see him, and found him in a grave condition suffering from erysipelas. He grew worse, and died a day later. A certificate was given by Dr. Fraser that death was due to heart failure produced by erysipelas, with pneumonia as a secondary cause. It was now asserted on behalf of the applicant that the erysipelas was set up by the abrasion, and compensation was claimed on the basis of average weekly earnings of 24s. 9d. Dr. Fraser supported this contention; and when asked why he did not report the case to the Coroner, if he thought that the death was accidental, he replied that it was an oversight. Dr. Chatterton, who said he was a demonstrator of morbid anatomy, declared that the facts were consistent with the erysipelas having been caused by the abrasion. Mr. Reed cross-examined him with a view to show that the erysipelas would not have followed so quickly if it had been the case, but the witness adhered to his opinion. Two medical witnesses were called for the respondents. Dr. Rostant said that when he saw the man at his surgery, there was an abrasion on his shin bone; and he gave him some antiseptic lotion, and advised him to go home. Witness did not think that the erysipelas arose from the wound; having regard to the antiseptic applied to it. It might have done so. He said he would be surprised if it did. Dr. L. P. Scott said that, having regard to the fact that the deceased fell ill the day after the mishap, he thought he must have had the disease within him, and the wound was merely a coincidence. Cases often occurred where there was no wound or abrasion. The period of incubation of the germ was usually five days. Evidence was also given by men who were working in the same gang as the deceased, and by the Company's foreman (Mr. Walter Dean). The latter said that the deceased entered the service of the respondents in April; and his wages were 5½d. an hour. Witness heard nothing whatever of the accident. On May 18, the deceased came and told him that he was queer, but said nothing about having been struck by a piece of concrete. Early in June, the deceased's mother-in-law came and told him that Kitchener was dead, and asked him to get up a subscription from the men. The other witnesses also swore that they neither saw nor heard anything of the accident. Mr. Reed, addressing the Court on behalf of the Company, contended that the application must fail, inasmuch as notice was not given of the accident, as required by the statute. The respondents were prejudiced because they were unable to have a medical examination made of the deceased before his death. His Honour, in giving his decision, said Mrs. Kitchener had told them that notice was given before the man died to a son of Mr. Dean; and although the latter had denied it, he was inclined to accept her evidence. But he would assume that no notice was served on the Company in any way. All he had to decide was whether the respondents had been prejudiced in their defence, or whether the want of notice was occasioned by a mistake or any other cause. In point of fact, he did not think that the Company had been prejudiced. Besides this, he had come to the conclusion that the deceased and his relatives did not know the erysipelas was really attributable to the wound, and therefore could not give notice. This was a reasonable excuse. Then the point had been taken that no accident happened to the man. This meant that the claim was a fraudulent one, and that the accident was a pure invention. But there was the fact that there was a small wound on the leg, which was seen by other persons besides the witness Hamilton. On the whole, he must come to the conclusion that the deceased received the injury through a piece of concrete striking him. With regard to the cause of the erysipelas, there was a direct conflict of medical testimony. If it did not arise from the wound, it was strange that up till the Monday the man was in perfect health, and that the erysipelas should show itself at that very place. He had sufficient medical evidence to enable him to say that, in his judgment, the erysipelas would never have caused the man's death but for the wound, slight though it was. He awarded the applicant £193, which was the equivalent of three years' wages.

Reductions in Price.—The Dartmouth Gas Company have reduced the price of Gas from 4s. to 3s. 9d. per 1000 cubic feet. At the meeting of the Saffron Walden Town Council last Friday, it was decided to reduce the price of gas from 4s. 2d. to 3s. 9d. per 1000 cubic feet, and to put on a rent of 1s. per quarter for 5-light meters, with a proportionate charge for larger sizes. It was stated that the alteration would be equivalent to a reduction of at least 3d. per 1000 cubic feet.

Incandescent Gas Lighting for the Albert Embankment.—At the last meeting of the Lambeth Borough Council, the Lighting Committee reported that all the lamps under the control of the Council have now been converted to the incandescent system; but the lamps on the wall of the Albert Embankment, belonging to the London County Council, still have flat-flame burners. This embankment is very dark at night, and people walking there are at times assaulted by men who frequent that part. Much of this risk would be obviated if the lighting were improved; and if the lamps were converted to the incandescent system a large proportionate saving would be effected. It was resolved to ask the London County Council to take the matter into consideration.

MISCELLANEOUS NEWS.

THE EXPLOSION AT THE SALTLEY GAS-WORKS.

Two More Deaths—The Extent of the Damage.

Unhappily, since the receipt of the particulars published in last Tuesday's "JOURNAL," two more deaths have taken place as a consequence of the disastrous explosion which occurred in the purifying-house at the Saltley Gas-Works of the Birmingham Corporation in the early morning on Monday of last week. This brings the fatalities up to three—Francis Jordan, who was dead when discovered, and George Gibbins and Herbert Elkington, who died in hospital from the shocking injuries they received. The effects of the explosion were so extensive that it does not even yet appear to be possible to arrive at an exact conclusion as to the amount of the damage to property that was involved. Rumour places the figure at from £15,000 to £20,000; but, at the same time, it is stated that the buildings and plant on the works are to some extent covered by insurance. With regard to the injury to surrounding property, the Gas Department lost no time in advertising for claims to be sent in; and a small army of glaziers has since been at work repairing broken window-panes—the houses in all the streets in the vicinity having suffered. In one street there were not more than half-a-dozen buildings the windows of which had not been shattered; while in others the damage was by no means so extensive. The latest available information with regard to the accident was furnished at the opening of the inquest last Friday, a report of which appears below. On page 169, a photograph is given which will afford some indication of the enormous destruction of property involved in the disaster.

Opening of the Inquest.

At the Victoria Courts, Birmingham, last Friday, Mr. ISAAC BRADLEY, the City Coroner, opened an inquiry into the circumstances attending the deaths of three victims of the explosion which occurred at the Saltley Gas-Works on the previous Monday, as reported in the "JOURNAL" the next day. Their names were Francis William Jordan (35), valveman; George Gibbins (31), under-foreman; and Herbert Elkington (36).

Mr. H. A. Pritchard (from the Town Clerk's office) watched the proceedings on behalf of the Corporation. Other city officials in attendance were Mr. G. Hampton Barber, the Secretary of the Gas Department; Mr. Henry Hack, the Engineer-in-Chief; and Mr. T. R. Murray, the Resident Engineer at the works. Mr. S. H. Knyvett, His Majesty's Inspector of Factories in charge of the Birmingham district, was also present.

The CORONER stated that it would be hardly possible to close the inquiry that day. There was a good deal of evidence that they might properly take, which would clear a certain amount of the ground; but there was other necessary evidence which was not available—such as the testimony of the two surviving men who were injured by the explosion. He proposed to call witnesses as to identity in the three cases, and the medical witnesses in order to release them, and then to take the evidence of Mr. Murray, Mr. O'Shea, the Works Foreman at Saltley, and such other statements of fact as were available.

Evidence of identification was then given. Mrs. Weaver, the mother of Jordan, said she had never heard her son complain of anything being dangerous at the works. Mrs. Gibbins made a similar statement in regard to her husband. Harry Elkington deposed that when at the hospital his brother, referring to the explosion, said he saw "one mass of flame, and no more."

Dr. *Craig* described the injuries to Jordan. He said the head and the upper part of the body were much scorched; the skull was fractured; and there was a large lacerated and contused wound over the left eye. The fracture of the skull was sufficient to cause death. He attributed death to shock and asphyxia. The appearances were consistent with having been buried by a mass of falling matter.

Dr. *A. J. Fairlie-Clarke*, Resident Surgical Officer at the General Hospital, described the injuries to Gibbins. He stated that on his arrival the man was conscious, but was suffering severely from shock. He had superficial burns on the face and hands; and several of his ribs were fractured. Death took place at 11.20 o'clock in the evening. A post-mortem examination revealed an internal rupture.

Dr. *Johnston* stated that the injuries to Elkington were of a somewhat similar character to those of Gibbins. A number of the ribs were fractured, and the right collar-bone was dislocated. There was also laceration of the lungs. He ascribed death to shock following the injuries. The two other injured workmen were progressing satisfactorily; and he thought they would have sufficiently recovered to give evidence a month hence.

Mr. *T. R. Murray* explained the process of gas purification, and described in detail the apparatus employed, and the method of regulating the flow of gas into the purifiers. He said the gas from the retorts entered in two streams into four oxide boxes, and finally passed through four lime boxes. The valves which regulated the inflow were situated on the main inlet-pipe, and there were similar valves on the main outlet-pipe. The current could also be regulated by a centre-valve on each of the two sections of oxide boxes. The cover fell inside the lute of the box; the vertical edge of the cover being immersed in the water in the lute. A hydraulic seal was formed, thus preventing the escape of gas. The cover was bolted down by a series of bolts arranged at the sides of the boxes. The passage of the gas was conducted partly by suction and pressure by a steam-engine in an adjoining building. This engine was fitted with gauges, which showed the engineer the amount of pressure and vacuum. Jordan had been working in this department for about two years. He had to watch an automatic record in the meter-house, and also to take temperatures at stated times. His book showed that at 4.30 a.m. on the day of the accident he recorded the temperatures and the quantity of gas made. His duties also included the regulation of the gas passing through the purifiers. If the pressure was too high, it could be eased by opening or closing certain valves. Witness produced sheets showing the pressure and vacuum records from 10 p.m. on the night of Sunday, the 9th inst., to the early morning of Monday. About 5 a.m. there was a great and sudden rise. After indicating much disturbance at a high pressure, there was a sudden fall. It would be the duty of the engineman to inform the valveman if the pressure was too high, and stand by his engine to slow-up if occasion demanded. The engineman, by slackening his engine, could moderate the force of the gas passing through the boxes. There were numerous window-shaped and door-shaped apertures in the purifying-house, for the purpose of giving light and ventilation. The house itself was lighted by hermetically-sealed gas-lamps fixed on the side of the walls. More often than not, however, the lights were out, and then safety lamps, after the style of a coal-miner's lamp, fitted with gauze, were provided. These could be used with safety when the atmosphere was charged with gas. Witness produced the lamp supposed to have been used by Jordan. The glass sides were broken, and the gauze was slightly dented, but not punctured. He handed in photographs showing the damage caused by the explosion. The gable-end of the purifying-house was demolished, and the roof and the iron and cement floor separating the two storeys were blown out. The roof of the annexe was also destroyed. The plant and appliances were greatly damaged by the explosion. The covers of the purifiers were punctured by the falling *débris*. Witness said he had not discovered anything to indicate that any part of the plant or apparatus was out of order before the explosion.

A JUROR pointed out that there was a rise of pressure between midnight and half-past twelve o'clock.

Witness said this was only equal to 12 points. It would not be dangerous unless the pressure rose to the maximum of 24 points, and was sustained at that for any length of time.

The CORONER: If there were exceptionally high pressure, what would happen to the purifier boxes?

Witness said that the seal would be "blown"—the water would be blown out of the seal. If a "blow" occurred, Jordan's duty would be to ease it on the particular section by partially bye-passing the gas. This would be effected by the valves.

Mr. *L. O'Shea*, the general foreman at Saltley, stated that the plant was in good order on the day before the explosion. One small repair to the centre-valve on the middle section was carried out on that day. Work was commenced at 10 p.m. on Sunday, and he found everything acting satisfactorily at 10.45 p.m. There were no lights of any kind in the purifying-house. In the ordinary way, no work would be in progress in that house during the night. No one would have occasion to go into it except the valveman. He (witness) left the works at 11 p.m. About five o'clock in the morning he was awakened by a loud report, and going to his bedroom window he saw a huge volume of flame rising in the direction of the gas-works. He hastened to the spot, and found that the purifying-house had been wrecked. The injured men were then being carried out. Witness at once shut off the section from further work. He examined the wall lamps of the house on the day following the explosion, and most of them were broken; but all the gas-taps were turned off.

Henry Hurdman, engineman at the works, stated that he resumed his duties at eight o'clock on Sunday night. At half-past four o'clock on Monday morning he noticed that the pressure in the purifiers was rising heavily. His duty was then to communicate with the valveman, and he accordingly went to No. 1 meter-house; but Jordan was not there. Witness returned to the engine-house, and finding the pressure still rising, he slowed-down his engines a little with the object of reducing the pressure. He again went into the meter-house to look for the valveman, and saw him coming from the back part of the house. Witness said to him: "Look about you, Frank, or we shall have a box blow directly." Jordan replied: "All right; it will be all right directly." They left the meter-house together, and Jordan turned in the direction of No. 2 meter-house, which was not in the direction of the purifying-house. Witness then resumed his duties in the engine-house. He promptly saw, from the action of the engines and the variation in the gauge, that a purifying box had "blown." He so slackened his engines that there would be a perfect balance between pressure and vacuum. On leaving the engine-house, he saw Jordan returning from No. 2 meter-house. Witness said: "Frank, the box has blown; I told you it would." Jordan made no reply. Another workman named Newton also hurried to the spot, and informed them of the blowing of the box. Jordan invited witness to go into the purifying-house; but he declined, as he had to attend to the engines. He left Jordan in the meter-house. The explosion occurred about 12 minutes later.

John Langley, retort-house foreman, stated that at 20 minutes to five o'clock on Monday morning he saw Jordan and Newton in the meter-house proceeding towards the door. Newton said to Jordan: "Where's the lamp, and is it alight?" Jordan fetched the lamp from a cupboard. He stopped until Jordan and Newton left the house. Jordan exclaimed, "We have —— it this time. Witness asked what was the matter; but Jordan did not answer. He said, however: "Come along with me, Jack; I want all the assistance I can get." Witness went as far as No. 2 retort-house, and he then told them that he could not leave the retort-house, but would send them all the assistance he could. He accordingly sent Gibbins, and afterwards Elkington. Witness returned to the vacuum gauges. At this time he did not know what had occurred.

Thomas Dyson, a crane driver, deposed that he saw Newton and Jordan go from the engine-house to the meter-house. Directly afterwards they were carrying a lighted safety lamp, and hurrying along to the purifying-house. They were followed by Williams and Elkington, who were running, and all entered the purifying-house. He saw a light being moved about in various parts of the building. He went in the same direction, and was only about 35 yards away when the explosion occurred. He saw a flash about half-way along the boxes—the flame seeming to run between them. The purifying-house was all lighted up; and then there was a terrific explosion, and the whole place

was wrecked. He promptly communicated with Mr. Murray, and then went to give what assistance he could to the injured men. He found Williams outside the purifying-house, while Elkington was just inside. There was a huge piece of masonry, weighing more than half a ton, lying across Elkington. There was no light in the purifying-house until one was taken there by Jordan.

Edward Morris, *John Pullin*, and *George Thorne*, who assisted in rescuing the unfortunate men, next gave evidence.

Inspector *Russell*, who was awakened by the report of the explosion, stated that on arrival at the gas-works the Fire Brigade were playing on the burning ruins. He assisted to recover the body of Jordan.

Alfred Soden gave evidence as to testing the lamps. He said this examination took place every day except Sunday. He tested the lamp used by Jordan on the Saturday preceding the disaster, and it was then in perfect order.

Richard Glaze, a valveman, stated that he had used Jordan's lamp early on Sunday, and it was then in perfect order.

The inquiry was adjourned to the 14th prox.

OMAGH GAS-WORKS PURCHASE.

Evidently, the Omagh Urban Council are finding it a very difficult matter to raise the funds required to pay the Gas Company the amount necessary before the works can be taken over by them. On the 3rd inst., the shareholders of the Gas Company met together at the works to consider a proposal made by the Council that they should take stock to be issued by the Council in payment of the amount due under the Arbitrator's award. After very careful discussion and consideration, the following resolution was proposed, seconded, and unanimously passed: "That the shareholders present either personally or by proxy at this meeting, and representing £11,328 out of the entire original capital of £12,000, as fixed by the Omagh Gas Company's Act, having considered the proposal made on behalf of the Omagh Urban Council to accept stock to be issued by the said Urban Council, in satisfaction of the amount due under the award made in the matter of the arbitration between the Company and the Urban Council, they (the shareholders) hereby refuse to accept such stock, and request that the Directors take such steps as they may be advised to compel the Council to pay the amount due in cash before handing over the works."

LONDON COUNTY COUNCIL AND THE GAS QUESTION.

Result of Last Year's Work—The Testing of Gas.

At the Meeting of the London County Council last Tuesday—Mr. J. Williams Benn, M.P., presiding—the Council's attitude in regard to the supply of gas in the Metropolis was before the members.

The Chairman, in the course of his address on the work of the Council during the past year, observed that the Public Control Committee looked after the citizens' gas, and were successful in obtaining in Parliament a reduction by the Gaslight and Coke Company of the standard price of gas from 3s. 9d. to 3s. 4d. per 1000 cubic feet; while through the Parliamentary Committee the Council were successful in obtaining the appointment by the Board of Trade of a Departmental Committee to consider thoroughly the whole question of gas testing.

The report of the Public Control Committee on the last-named subject, already given in the "Journal" (*ante*. p. 121), was then formally received, and the first recommendation, suspending the operation of the Standing Orders limiting the period for considering applications to Parliament, was agreed to.

The second recommendation was then submitted, as follows:—

> That the necessary measures be taken for promoting, in the next session of Parliament, legislation for the amendment of the law relating to the testing of gas in the County of London, on the lines indicated in the recommendations of the Departmental Committee appointed by the Board of Trade, and for dealing with the following additional points: Appeals on Gas Examiners' reports, and the Chief Gas Examiner's powers relative thereto; the time within which legal proceedings may be taken; the amendment of a Gas Examiner's report by the Chief Gas Examiner, and the formal proof of the latter's signature to a report; and the repeal of certain obsolete sections of the Metropolis Gas Act, 1860.

Mr. W. C. Johnson moved, as an amendment, to insert after the words "Board of Trade," in the fifth line, "with such modifications as may be thought desirable by the Parliamentary Committee, after consultation with the Public Control Committee." He contended that the recommendation did not carry out the intentions of the Committee as stated in the preamble. The Committee did not approve of recommendation (*f*) of the Board of Trade Committee, with regard to the removal of sulphur impurities; but if the recommendation now submitted were approved, the Council would be committed to legislation including recommendation (*f*). The Public Control Committee, in their third recommendation, stated that certain financial alterations should be made in connection with the sliding-scale. If the Council adopted the second recommendation as standing on the paper, they would be precluded from taking action with regard to this matter.

Mr. H. A. Harben (the Chairman of the Committee) said he had no objection to the amendment, as Mr. Johnson seemed to think it carried out more accurately the idea of the Committee. They wished the words "on the lines indicated" to carry out their intention as expressed in the preamble to their report. The "lines indicated" in the report, before the recommendations, were not in the Committee's report, but in that of the Departmental Committee, and were merely quoted in the report of the Public Control Committee.

The amendment was then put and declared to be carried; and the recommendation, as amended, was approved.

The third recommendation, requesting the Parliamentary Committee to frame such proposals for new sliding-scale arrangements in regard to the price of gas in London as they might consider practicable, was also agreed to.

THE MUNICIPAL TRADING QUESTION IN EDINBURGH.

Gas Commissioners Receive Deputations of Traders.

On Monday last week, the Edinburgh and Leith Gas Commissioners received deputations from the South Side Merchants' Association and from the plumbers and ironmongers of Edinburgh and Leith, upon the question of municipal trading. The Lord Provost (Sir Robert Cranston) presided.

The proceedings turned chiefly upon three documents: The memorandum by Mr. Herring, dated the 16th of June, which was published in the "Journal" for the 12th of July (p. 127); the memorial by the plumbers and ironmongers, which was referred to in "Notes from Scotland" on the 4th inst.; and a memorial by the South Side Merchants' Association, which has not hitherto been published. This memorial was in the following terms:—

> We, members of the South Side Merchants' Association, representing a membership of over 220 merchants, shopkeepers, and traders, beg to lay our humble protest before the Gas Commissioners against their engaging in the sale of gas-stoves, gas-fittings, burners, and cooking utensils, and with special reference to the practice now adopted by the Gas Commissioners of fitting up stoves and other gas-fittings, and supplying the pipes and labour free of charge. Having regard to the discussion which has already taken place on this question in the newspapers, by important associations of ratepayers and merchants, and by representative opinion in Edinburgh and Leith, all of whom have expressed deep concern because of the extension in municipal trading which has been undertaken by the Gas Commissioners in business which has hitherto been conducted by the tradesmen, traders, or shopkeepers of Edinburgh and Leith—these traders being a class who are largely responsible for taxes and rates, as well as being important gas consumers—and, further, after having considered the various views which have been expressed against such-like municipal ventures in trade, and the arguments which have been advanced to support them, we give the following reasons for our protest, in the present case before us in this memorial, that such trading should be abandoned:—
>
> 1.—Because there is no sound reason why the Gas Commissioners should sell gas-stoves and gas-fittings, since the latter is a branch of trade in which there is a keen rivalry all over Edinburgh and Leith; and before the Gas Commissioners began to push the sale and hire of gas-stoves, traders had made rapid progress in educating people to the use of gas-stoves, and the advantage to be derived from so doing, the sale of which was greatly increased through their agency.
>
> 2.—The Gas Commissioners should not be traders in gas appliances, as by so doing the principle is involved of "Corporation trading," which, if encouraged, will constitute a danger to the well-being of the trading community, upon whose success depends the welfare of all classes.
>
> 3.—Because ordinary trading is best for the community, and under it tradesmen and merchants in open competition give their special knowledge and best services; and experience has proved that the employment of individual traders is more economical than when work is done under the management of a corporation.
>
> 4.—Because no special advantage has been gained by the Commissioners engaging in the sale of gas-stoves and fittings which could not be at least equally well secured to the citizens through ordinary traders.
>
> 5.—Because to tax owners and tenants of shops and warehouses upon the value of their premises for business purposes, and then, by Gas Commission trading and competition, and especially by the unfair competition of taking the gas consumers' capital, to give labour and pipes for gas-cookers without charge, and thus to take from the trader the value upon which he is assessed, is a departure from fair business and principle which will most surely react upon the citizens to their loss.
>
> 6.—Because it is not just to select any particular class of goods for municipal trading, knowing that, were the same course applied with respect to other articles of commerce all round, the system would be found unworkable, and economical aim impossible of realization. Gas Commission trading in stoves and fittings, if continued, can be urged with consistency as a precedent to establish municipal trading in other lines of goods.
>
> 7.—Because the Gas Commissioners have for several years been selling and hiring gas-stoves and fitting them up; and, according to the Gas Manager's report, in effect there has been a huge loss to the gas undertaking. Therefore the memorialists view the extensions lately undertaken by the Gas Commission in opening sale shops as ill advised.
>
> 8.—Because any loss incurred as a consequence of the Gas Commission selling and hiring stoves and fitting gas-cookers to the consumers free of charge must be borne by more than 80,000 gas consumers; and as less than 10 per cent. of the consumers have stoves, and they being almost entirely of the wealthier and middle classes, it follows that the working class and non-users of stoves are largely called upon to make good the loss incurred in giving special advantages to those who can best afford to pay, as without such loss gas would be proportionately cheaper to all consumers.
>
> 9.—It is contended by the Gas Commissioners, in support of what they are doing, that the selling of stoves and gas-fittings by them is the best method to the ultimate sale of gas. But by so doing they have created a monopoly by means of cutting prices and fitting up appliances free of charge, all at the expense of the general body of gas consumers, which policy has had the effect of clearing the field of competitors in gas-stoves—thereby confining the trade to the hands of a few makers, and thus preventing the development of private enterprise, and dismissing from service in respect of gas interests a vast number of pushing traders and skilled tradesmen, all of whom would otherwise be workers for the increase in the consumption of gas, and none of whom would receive other pay than that obtained for their services from those who employ them; while, on the other hand, the Gas Commissioners have to support a large staff of employees (not always fully employed), and to bear other heavy expenses in pursuance of a policy of trading which can only bring loss to the Trust, and maintain the price of gas at a higher rate than need be.
>
> For the foregoing reasons, the memorialists commend their cause to the consideration of the Gas Commissioners, and take their stand upon the principle involved in the whole aspect of the question, and upon the reliable safeguard worn by time and experience into the law of supply and demand, assisted by open competition, to interfere with which a city's trustees would be committing its citizens to unseen, and it may be grave, issues.

Mr. D. Reid, the President of the South Side Merchants' Association, besought the Commissioners to give the memorial their best consideration.

Mr. J. R. Alexander said the memorial was supported by every member of the Association, except one, who was a Gas Commissioner. As business men, they felt that there should not be that difference of opinion upon the question of how to "boom" the consumption of gas

which there appeared to be at present, and which was causing friction between a large section of the public traders and the Commissioners. They did not desire to provoke discussion at this meeting, as they recognized that the changes which might be introduced as the result of their memorial must be the outcome of careful consideration. They asked for the appointment of a Committee of the Commissioners to meet with a Committee from the Association with a view to their conferring together, and endeavouring to bring about a more harmonious condition of affairs. The Association had approached the question of corporation trading as citizens and traders, and not as a class for selfish interests. Very few of their members were interested in the sale of gas stoves and fittings; but they held that, in supporting the traders who were interested, they were upholding a principle which directly affected all trades, and the public as a whole.

In reply to questions,

Mr. ALEXANDER said the Association objected on principle to corporation trading, whether it resulted in loss or gain; and they took the statement that there had been a loss to the Commissioners from Mr. Herring's memorandum of the 16th of June. At all events, they surmised that there had been a loss.

The LORD PROVOST said they could hardly deal with surmises. Did they mean to say that the money paid for gas by shopkeepers, supposing there was a loss upon the trading, would be sufficient to allow of the gas being reduced in price?

Mr. ALEXANDER: Distinctly.

Mr. R. MENZIES asked if the objection on principle was the main one, or whether there was any separate objection to the three shops which the Commissioners had opened within the past six months? Was it their desire that the shops should be closed?

Mr. ALEXANDER said they objected not only on the general principle, but also that there was a loss to the consumers, and therefore to the citizens, because they could scarcely separate the gas consumers from the citizens. He thought it was evident there was a large loss.

Mr. A. MORRISON, representing the plumbers and gas-fitters, then addressed the Commission. Referring to the statement in Mr. Herring's memorandum, that the Commissioners had power to deal in gas appliances, he said it did not necessarily mean that Parliament was aware that there was any need for the clause giving this power. It received the sanction of Parliament, but was not discussed. At that time (1888), the business of gas heating and cooking was in its infancy. The traders of Edinburgh were then doing a good business in it; but they were doubtless unaware of the clause being inserted in the Act. Within the last three years, in several towns in which the gas supply had been taken over, a clause of the same description was inserted; and on the traders objecting to it, it was deleted. In London last year, successful opposition was given to the London County Council's Bill which sought to confer power on twenty Metropolitan boroughs to set up shops for the sale of house fittings and electric lamps. Their attention was called by Mr. Herring to the sale of oil lamps and stoves. As a matter of fact, 60 per cent. of the traders who now petitioned had no interest in the sale of oil lamps or stoves. He thought it should be to the advantage of the Gas Commissioners to have 350 agents for the sale of gas appliances instead of three shops. The deputation would have no objection to the hiring of gas-cookers, provided that no loss was sustained. Mr. Herring, in his memorandum, said the policy he advocated would do no harm to the traders. He (Mr. Morrison) could prove not only that it would, but that incalculable harm had already been done. Mr. Herring also said he had made inquiries at a number of important towns, and found that they all sold at considerable discounts below list prices. He (Mr. Morrison) wrote to, and had information from, the whole of these places. He found that in four out of the ten, shopkeepers were employed to fit up cookers; and as to the selling of gas-fittings, in five they did not sell any, in one practically none, and in three the companies did. One corporation sold at list price. Out of the ten places, four were served by companies, and the remaining six by corporations.

The LORD PROVOST asked for particular instances.

Mr. MORRISON said that the replies he received from Bradford were that the gas supply was in the hands of the Corporation; that they sold gas at 2s. 1d. per 1000 cubic feet less 5 per cent. discount to all parties; that they did not fit up free of charge gas-cookers or other appliances for cooking or heating; and that they sold cooking-stoves at 15 per cent. discount, but did not sell fittings. The plumbers were trying to work with the Gas Commissioners, and wished to press the use of gas, as it was their business to do so; and they trusted the Commissioners would give favourable consideration to their views.

Mr. A. GILCHRIST, representing the ironmongers, said they had reason to complain of the erroneous information which had been given to the Commissioners by their Engineer. Speaking for the gas administrators of the world, Mr. Herring took it upon himself to say that private traders had done nothing to foster the use of gas. This was rather a serious charge, and he resented it. He held in his hand proof to the very opposite. From one firm alone there passed through the traders of Edinburgh and Leith no less than 450 gas heating appliances; and this did not represent anything like the total number sold. In 1891, the first year the Gas Commissioners started to sell fires in opposition to the traders, they found that the Gas Commissioners sold 4 stoves, against the traders' output, from that one firm, of 393 stoves. In 1903, after twelve years of municipal trading, the Gas Commissioners sold 361 stoves, against 127 sold by traders—still confining himself to the one firm. Out of the 361 sold by the Gas Commissioners, practically none were sold to traders. Mr. Gilchrist proceeded to argue that 30 per cent. of the gas consumers' money had been lost, or equal to 2s. 6½d. on each of the 85,000 consumers. This was according to the statement of their Engineer. The Commissioners had spent on gas apparatus £32,616. Fitting up would cost (say) 10s. each. This, on the 6812 stoves hired out, as in 1904, amounted to £3406; raising the total expenditure to £36,022. Then he received £9961 for the hire and sale of these stoves, and he valued the stock on hand at £15,252. This made £25,213, and left a total loss of £10,809 on the gas-stove department alone. Was it possible for any honest trader to compete against such trading? Mr. Herring said he allowed a special trade discount of 20 per cent. to traders on all gas appliances; but, from inquiries made, not one trader could be found who had received any better terms, in this respect, than the public. On the other hand, he was sorry to say, cases had come to their knowledge of traders being absolutely refused any extra discount whatever. There were other statements in the memorandum the accuracy of which they called in question, and could disprove; but sufficient, perhaps, had been already said. They were convinced that the work of fitting up could be done more economically by traders than by the Gas Commissioners.

Mr. YOUNG asked whether, assuming that the Commissioners could satisfy the deputation that trading was a benefit to the gas consumers, they would persist in their opposition to it.

Mr. MORRISON said they considered that the principle was wrong, whether or not it benefited the consumer.

Bailie BRYSON, of Leith, asked if the statement that no trader had been allowed 20 per cent. discount could be proved.

Mr. D. CAMERON said he had been repeatedly refused discount.

Another case was cited in which no discount had been allowed.

The LORD PROVOST asked if the traders would have any objection to the Commissioners keeping a show-room, and, if a trader brought a customer to it, who selected a stove, the Commissioners should pay the former a discount.

Mr. GILCHRIST said not at all. They had no objection whatever to a show-room being kept open for the exhibition of apparatus.

Bailie MALLINSON remarked that if this were done the Commissioners' loss would be greater than ever.

Mr. T. PROCTOR, who said he was distinctly against corporation trading, irrespective of whatever benefits accrued to the one side or the other, expressed the thanks of the deputation to the Commissioners for the quiet discussion they had had over the very serious question brought before them.

The LORD PROVOST said the deputation must not go away with the feeling that the Gas Engineer was in any way against the trade. Knowing him as he did, he knew that he was trying to do his very best to improve the sale of gas, and had no intention of doing the traders any injury. He might also say that there was not a gentleman round the table who had any desire to injure the trade of the city. He was not going to admit or deny that some hardships might have occurred. But the Commissioners would give the matter their full consideration; and he hoped they might be able to solve the difficulty in a satisfactory manner.

The deputation then withdrew, and the Commission sat in private as the Works Committee. It is reported that Mr. Herring has been asked to reply to some of the statements made, and that thereafter the Commission will meet to consider the whole matter.

Meanwhile, Mr. Herring has lodged the memorandum which was promised at a previous meeting of the Commission, as to the cost and character of the work done at the various district depôts. In it, he says that the office in Leith costs the Commissioners £323 per annum for the clerical staff, which consists of three men. The staff is principally engaged in the administration of the out-door departments, and involves a wages bill of £8790 per annum. They are also engaged in the collection of gas and coke accounts, the receipt of orders for gas, the discontinuance of the same, notice of escape, deficiencies, &c., as well as the hire and sale of fittings. The total transactions during the year 1903-04 amounted to 24,079, of which 957 had relation to gas cooking-stoves and the sale of gas-fittings. The abandonment of the sale of gas stoves and fittings would not enable them to reduce the staff in that department; on the contrary, any increase in the sale of gas appliances would proportionately reduce the cost of its administration. The Glenogle Road office costs £149 per annum for the clerical staff, consisting of one man and a junior. The total transactions during 1903-04 amounted to 10,686, of which 1321 had relation to gas cooking-stoves and the sale of gas-fittings. The Portobello depôt costs £78 per annum. The total transactions during the year 1903-04 amounted to 2343, of which 89 had relation to gas cooking-stoves and the sale of gas-fittings. If the sale of gas stoves and fittings were abandoned, it would still be necessary to keep this office open. In the Waterloo Place show-rooms, the staff costs £180 per annum, and consists of two men. In this department, the entire services are devoted to the exhibition of gas cooking, heating, and other appliances. The transactions during the year ending May 15, 1904, numbered 6190. The depôts at Leith, Glenogle Road, and Portobello are also district stores for supplying workmen engaged at gas-fitting and main-laying operations. The new district depôts and show-rooms are estimated to cost as follows: Newington Road £138, Morningside Road £133, and Leith Walk £120—a total of £442, or, with taxes, £472. It is estimated that the new shops will save several hundreds of pounds per annum on the wages bill of men engaged in district work. The profit to be derived from the use of the shops will depend entirely upon whether they may vigorously sell the appliances put on show. Already, to date, the transactions total 1179, of which 846 had relation to gas cooking-stoves and the sale of gas-fittings.

In a further statement by Mr. Herring, showing the state of the gas-stove account as at May 15, it is stated that the amount paid for stoves, &c., since 1890 was £33,370. The expense of repairing, fitting, &c., was £21,109, making together £54,479. The total amount received for hires had been £20,272, for stoves, fires, &c., sold £7226, and for fittings £3127. There had been charged to revenue account, for cookers broken up, £182; and for fitting, repairing, &c., £11,155—together £11,337, leaving, as per capital account, the value of cookers, fires, &c., on hand or lent on hire at May 15, £12,517. The total number of cookers on hire was 6773, and the number in stock 266.

His Majesty the King has graciously consented to give his patronage to the Sanitary Institute. The Institute, of which Mr. E. White Wallis is the Secretary, was founded in 1876, and it is carrying on a large work in teaching and examining in hygiene and sanitary science, both in the United Kingdom and in other parts of the Empire. It maintains in London a permanent museum of sanitary appliances, which is open free to the public. Its members and associates number upwards of 3000.

DEVONPORT GAS AND ELECTRICITY UNDERTAKINGS.

At a Meeting of the Devonport Town Council on Thursday, the Gas Committee reported that they had had before them various reports on the subject of the proposed water-gas plant for the gas-works, including those of the Consulting Engineers and of the deputation appointed to visit other towns. Before coming to a decision on the subject, the Committee resolved to have these reports printed.

Mr. C. GOODMAN complained that the report of the Consulting Engineers was not read to the Committee, though that of the deputation was. Mr. Stevenson, of the firm of Messrs. Stevenson and Burstall, was the only expert of the four who went to visit other works. He (Mr. Goodman) moved that the report of the Gas Engineer to the Corporation should also be printed with the other documents.

Mr. TOZER said the question the Committee were considering was one of great importance to the consumers and ratepayers. If what they heard as to the Gas Committee's meetings was true, there were thousands of pounds involved, and the scheme was one which would make or mar the future of the works. It was a great pity the Committee did not present a unanimous report to the Council. He did not remember a case before in which there had been two reports; and there was surely no necessity for it. They ought to have a report from the Engineer, who was a practical man, and then it would be for the Council to decide which course to adopt. Delay in the matter meant loss to the Corporation and inconvenience to consumers.

Mr. LITTLETON said the Gas Committee, at their last meeting, listened to all they could hear on the subject, including the majority and minority reports of the Committee. He moved that the Gas Engineers' report and other information which the Chairman had should be printed, in addition to the reports of the Sub-Committee, so that the Gas Committee might be placed in possession of all the facts. It was unfair that the matter should be discussed in public before it was dealt with by the Committee.

Mr. HORNBROOK, the Chairman of the Gas Committee, said that some of those who now complained of delay were partly responsible for it, because they did not attend meetings at which the matter should have been discussed. There was, however, no cause for hurry. They could not have the plant this winter, and were told that, to get it for next winter, it would be sufficient to place the order four or five months hence. He had no objection to the report of the Resident Engineer being printed. If this were done, he hoped it would meet with a better fate. On the last occasion, both his report and that of the Consulting Engineer were ignominiously rejected.

The resolution as to printing the reports was then adopted.

Mr. SHORT complained that the indecision of the Gas Committee with reference to the water-gas plant had prevented the carrying out of the undertaking of the Corporation to extend the gas-mains into the suburbs added to the borough in 1898.

Mr. HORNBROOK said there had been no unavoidable delay. The area of supply would be extended next year. It was intended to begin the work in the spring, so that by next winter the needs of the residents in the outer area would be met.

Mr. BANBURY, the Chairman of the Electric Lighting Committee, proposed that application be made for sanction to borrow £7958 for the extension of the electricity works. In justification of the outlay, he pointed out that in Plymouth the output was 122,000 units in August, and the capital expenditure was £131,651; and £20,000 more was to be borrowed. In Devonport, the output for the month of August was 133,000 units, or 8 per cent. more than at Plymouth, and the capital was £107,169, or 34 per cent. less than the amount sanctioned at Plymouth up to March 31 last. With regard to works cost, the total charge at Devonport was 1·09d. per unit, as against 1·61d. per unit at Plymouth, or a little more than ½d. per unit in favour of Devonport. They were now utilizing the whole of the machinery,and there was an absolute need for more plant to supply their customers.

The recommendation was adopted.

SOUTH AUSTRALIAN GAS COMPANY.

The Annual Meeting of this Company was held at the Offices, Grenfell Street, Adelaide, on Aug. 25—Mr. J. ACRAMAN presiding.

The report and accounts for the year ending the 30th of June, noticed in the "JOURNAL" for the 20th ult., having been presented,

The CHAIRMAN, in moving their adoption, remarked that, notwithstanding the opposition of the Electric Light Company and other undertakings, the Gas Company managed to make the usual profit. People need not look upon gas as a dead concern at all; it was a very live industry. Although travellers saw strange things in other lands, he would give them a little information which would serve to allay the anxiety caused lately by some persons. A gentleman who recently visited Paris had reported that nearly all the gas-lamps in the city were being replaced by electric lights. As a matter of fact, he had mistaken the superior gas light, with improved burners, for the electric light. In Paris there were 64,000 gas-lights in the streets, compared with 1820 electric lamps, or thirty gas-lights to one electric lamp. In Berlin the proportion was thirty-five gas to one electric; while in London, which was not so up-to-date, it was twelve gas to one electric. Papers had recently been received showing that in many districts there had been a considerable increase in the number of gas-lights. Having quoted statistics to show how the introduction of electricity had caused an increased use of gas, he went on to say that the Company had made a departure by the introduction of the penny-in-the- slot gas-meter, and had fixed between 700 and 800 of them; while further applications were always coming in. He thought the progress made had been very satisfactory, and the work would be continued. Their shop for the sale of fittings, &c., had been quite a success. It had been opened not so much with the view of making a profit, as with the idea of supplying their customers with modern gas-fittings and globes; and they were not (at the prices charged) incurring a loss. During the year the new retort-house had been completed at the Brompton works. The building had become a necessity, as the Engineer had previously been heavily taxed, especially on cold days, to supply the requisite quantity of gas from the old works. The cost would be between £13,000 and £14,000. They had now commenced to use the house. Hitherto, with the exception of North Adelaide, the whole of the supply of gas to the city had come through one big main, which crossed the Torrens. Owing to the constant removal of sand from the bed of the river, they had been rather anxious as to whether the main would be carried away by the floods, and the supply of gas cut off from the city. After a great deal of negotiation they had received permission from the City Council and the Corporations of Thebarton and Hindmarsh to duplicate the main under the large bridge there; and this would give them two strings to their bow.

Mr. D. NOCK seconded the motion, and it was carried.

The CHAIRMAN proposed a resolution authorizing the Directors to borrow on mortgage or bond a sum not exceeding £100,000. He said the Company was the only gas undertaking in Australia which had no money borrowed on debentures; and the necessity for raising some arose because they had spent about £100,000 more than the paid-up capital, and under their Act they could not issue more shares. They had power, however, to borrow; and though they asked authority to do this up to £100,000, they had no intention of raising more than £25,000 or £30,000. They could not carry on the business without stock; and it was therefore necessary always to have money in hand.

Mr. W. CULROSS seconded the motion, which was carried.

The proceedings then closed.

TURIN GASLIGHT COMPANY.

The Annual Report and Balance Sheet.

We have received, through the courtesy of Signor Beria Luigi, the Engineer and Manager, a copy of the report which was presented to the meeting on Sept. 15, of the shareholders in this Company (Società Anonima dei Consumatori di Gas-Luce). It relates to the twelve months ending June 30, and is of an unusually exhaustive character and embellished with numbers of illustrations of new plant and buildings which have been erected at the Company's works. In view of the special importance which thus attaches to this year's report, we give below a somewhat full abstract of its contents.

The quantity of gas sold during the twelve months was 13,641,929 cubic metres (481,786,500 cubic feet), which was an increase of 581,171 cubic metres (20,525,000 cubic feet) over the quantity sold in the preceding twelve months. The largest amount sold by the Company in any one year was 13,680,247 cubic metres, in 1897-98, when the National Exhibition was held in Turin; and it will be seen that this maximum has been nearly reached in the last working year. Thus, notwithstanding the reduced consumption of the Welsbach burner, the constant and general increase in the amount of gas consumed, which is indicated by the statistics published in the English and German "Gas Journals," is now being experienced by the Company. To illustrate the relative progress of gas consumption in Turin as compared with other Continental towns, figures are quoted which show that, whereas the increase in the last two years has been 11·33 per cent at Turin, at Zurich it has been 19·16 per cent., but at Cologne only 5·65 per cent. The consumption per head of the population per annum is still somewhat backward at Turin; being about 2825 cubic feet, as compared with slightly over 3300 cubic feet at Cologne, 3335 cubic feet at Zurich, and 4975 cubic feet at Charlottenberg. The selling price of gas during the twelve months was: To private consumers 14 centesimi, and to the Municipality 12 centesimi per cubic metre (about 3s. 2d. and 2s. 8½d. per 1000 cubic feet respectively). It is shown that this is a considerably lower price than prevails at Charlottenburg (3s. 8d.), Cologne (3s. 8½d.), or Zurich (5s. 4½). Nevertheless, the Company have reduced their price for gas, as from the 1st of July, by 1 centesimo per cubic metre; thereby making the charge to private consumers only 2s. 11¼d. per 1000 cubic feet. The unaccounted-for gas had reached in 1901-02 the excessive amount of 18·54 per cent. of the make; but, thanks to the measures taken by a Special Committee, it was reduced in the last twelve months to 9·95 per cent.

The public lighting of Turin is by means of 2452 gas-lamps, of which 53 have been added in the course of the year. The equipment of the Turin Gas-Works has undergone extensive improvement in many directions. Special attention is directed to the new engine-room and a new central pumping plant which have been completed during the twelve months under review. A beginning has been made in the work of re-roofing the retort-house, which, after forty years' wear and tear, had become imperatively necessary; and opportunity is being taken at the same time to increase the height of the walls of the house. The wages paid averaged about 8½d. per 1000 cubic feet of gas made. The Company have under consideration the provision of dwellings for their workmen. The purchase of the undertaking by the Turin Corporation has been mooted; and at one time the quotation for the Company's stock rose from 200 to 235 lire per share in anticipation of the purchase being carried out. In regard to the interests of the consumer, however, it is pointed out that the price charged by the Company for gas is considerably lower than that prevailing in any of the larger towns of Italy where the supply is in the hands of the municipal body; and the prices at the present time in 13 such towns are quoted in support of this statement.

The financial accounts show that, after payment of interest at the rate of about 5 per cent. per annum on the share capital, there remains a balance to the credit of the profit and loss account of 78,216·53 lire (about £3129).

The Electric Power and Lighting Committee of the Liverpool Corporation have decided to submit the following recommendation to the City Council: "That the lamplighters who have been lamplighters for ten years receive 1s. per week extra pay, and that those who have acted in that capacity for twenty years shall receive 2s. per week extra pay."

POSITION AND DEPTH OF MAINS IN PUTNEY.

At the Meeting of the Wandsworth Borough Council on Wednesday, a letter was read from Mr. J. C. Radford, on behalf of Lord Westbury, objecting to the laying of a gas-main under the footpath in Haylewell Road, Putney, and inquiring whether the Council had given the Wandsworth and Putney Gas Company permission to put mains under the footpaths of the roads on Lord Westbury's Putney estate. The Highways, Sewers, and Lighting Committee reported, in regard to this matter, that the Council having ordered certain new lamps to be erected in the road in question, the Company proceeded to lay mains for the purpose of supplying them with gas; but the Council had not made any order as to their position. It was decided to inform Mr. Radford accordingly, and also to say that the Council were of opinion that mains of small size such as those in the Haylewell Road, should be placed under the footpaths. Another report was read from the Committee to the effect that, under the provisions of the Company's Act of 1900, before putting down mains in new streets laid out but not taken over by the Council, they are required to give three days' previous notice to the Council, who must within 48 hours notify to the Company the reasonable depth from the surface and the position in the road wherein the mains are to be laid. In the event of the Council not giving the notification referred to, the mains may be laid as the Company think fit. The Committee recommended that the Company should be asked to give the required notice in future, and that the Surveyor be authorized to notify to the Company as to the depth and position in which the mains are to be laid. This was agreed to.

THE PUBLIC LIGHTING OF CROMER.

Incandescent Gas v. Electricity.

At the Meeting of the Cromer Urban District Council on Monday last week, the Highways Committee reported that they had had before them offers made by Messrs. Edmundson's Electricity Corporation and the Cromer Gas Company with reference to undertaking the lighting of the town; and they recommended the Council to enter into an agreement with the Gas Company for a period of four years for lighting, repairing, and extinguishing the lamps in the district on the terms set out in their offer—viz., to supply gas to, clean, repair, light, and extinguish lamps at £2 per lamp; the Council to pay for the alterations necessary to the existing lamps, and to purchase the automatic apparatus required for lighting and extinguishing, on the three-years' hire-purchase system. Subject to these recommendations being adopted, they had given instructions for the trial electric lamps on Norwich Road to be discontinued. Mr. Bower asked whether Messrs. Edmundson or the Gas Company had been asked to give terms for the lighting of the town, because the present system had broken down. The Chairman said he did not think so. The Highways Committee considered as to which of the two systems was the cheaper, and came to the conclusion that they would ask the Gas Company to light the town. Mr. Davison inquired as to the cost of the gas-lamps at the present time. The Clerk replied £2 13s. 9d. each per annum. He added that the price quoted included everything during the four years. There were 160 lamps, and the Company undertook the lighting, extinguishing, and cleaning. Mr. Davison thought the Committee had shown great discernment and discrimination in arriving at their conclusion. The adoption of the report having been moved and seconded, Mr. Broadhurst complained of the defective lighting of a certain portion of the town; whereupon the Chairman said the best way would be to ask the Highways Committee to consider the lighting of the part in question at their next meeting, and report to the Council.

POISONING BY GAS AT SOUTHPORT.

Dangers of Defective Gas-Taps.

The sad death of a boy named John Arthur Fletcher, aged six years, son of Mr. Frank Fletcher, tinsmith, of 12, Chestnut Street, Southport, occurred on the 8th inst. The boy, with his sister, aged 16, retired to rest in the same room, and the girl turned off the gas. But on the following morning both children were found in bed unconscious, with the gas escaping in the room. Medical aid was summoned; but the boy succumbed late on Monday night. On Tuesday it was feared the girl would die also. The matter was inquired into by the County Coroner (Mr. S. Brighouse) on Wednesday, when the father of the boy stated that the gas-tap in the room occupied by the children was defective, and would turn completely round. There was no ventilator or fire-place in the room. In answer to an inquiry by the Coroner, he said his daughter was still unconscious; and he added that it seemed possible that before getting into bed she put out the gas, and in so doing turned the tap too far round. Dr. S. Backwell Fenn, who was called in on the discovery of the children, said the cause of the boy's death was poisoning by coal gas. The girl slept nearest the door, which was partly open, and therefore she would get the maximum of pure air in the room. He had hopes of her recovery. The Coroner said there was no evidence of the gas having been turned on wilfully, and the question for the Jury was simply whether or not the boy's death was the result of misadventure. A juror referred to the defective gas-tap, and said there were many similar ones in the town. The catch wore away, and allowed the tap to be turned right round. The Jury returned a verdict of "Death by misadventure," and expressed their sympathy with the parents of the child.

It was stated at the last meeting of the Clonmel Corporation that since the gas-works were taken over, the profits of the concern had contributed £4000 towards the reduction of the rates.

A GOOD YEAR AT PONTYPRIDD.

The Gas Committee of the Pontypridd Urban District Council held a special meeting last Tuesday, for the purpose of receiving the statement of accounts for the year ending March 31. The report of the Deputy-Clerk and Accountant (Mr. L. R. Williams) stated that on capital account the sum expended was £94,459 7s. 0½d. The revenue account showed that the gross profit on the year's working was £5883, which was equal to 6·22 per cent. on the capital expended, compared with £4860, or 5·27 per cent., the previous year. The expenditure on distribution had been abnormal; the repair and renewal of mains and services being responsible for an increase of £721 over last year. The income showed that the sales of gas to private consumers had increased by nearly 6 million cubic feet, representing £1222. The receipts for public lighting had decreased by £94, owing to the price having been 3s. 3d. per 1000 cubic feet throughout the year. The net profits for the twelve months amounted to £1774. The Chairman (Mr. W. Jones) said he thought the Council could be congratulated upon the wonderfully good results, which could not fail to be satisfactory. He explained that £35,000 was paid for the old works, and they had to pay interest on the money borrowed; but if they dealt with the capital that was of effective value, the profits would work out to nearly 10 per cent. The report was adopted, and the Accountant was congratulated by the members.

ELECTRIC LIGHTING AT WALTHAMSTOW.

Allegations of Mismanagement.

The Walthamstow Urban District Council having applied to the Local Government Board for sanction to borrow sums amounting to £46,224 for purposes of electric lighting, and £2093 for private street improvement, Major J. STEWART, R.E., one of their Inspectors, recently attended at the Town Hall to investigate the matter. The inquiry excited some interest with respect to the application for the £46,224 for electric lighting.

Mr. C. S. WATSON, the Clerk to the Council, submitted a long statement setting forth the various items making up the total amount applied for. The following related to electric lighting: £7900 for the extension of the cables; £18,460 for enlarging the generating station and additional plant; £17,850 for expenditure on the undertaking in excess of sanctions up to Aug. 31, 1903; £370 for a spare armature; £394 for cables; and £1250 for workshops at the electric light station. Mr. Watson explained that the station was opened in October, 1901, and the plant was overloaded in the month of December in that and the following year. So great had been the progress of the electric light in the town, and so low the cost of production of the current, that the Council had been able to reduce the price of electrical energy during the past year. This was a second reduction that had been made since the works had been in operation, and the price was now 4d. per unit, which, with the discount of 7½ per cent. to large consumers, brought it down to 3⅜d. per unit. He then proceeded to deal with the various sums constituting the total amount applied for in respect of electric lighting. With reference to the item of £17,850 for over-expenditure, he stated that this had arisen mainly through the Council having to cable a much larger number of roads than was originally anticipated; and the reason for urgency was that if the Council had delayed to supply consumers until the expenditure was sanctioned, a large amount of custom would have been lost. The profit on March 31, 1903, was £3500; and the results had proved that the undertaking had been one of the most successful in the county. The Council therefore trusted that the Board would sanction the loan, and grant the longest possible period for its repayment.

Mr. BATTEN, Solicitor, said he represented the Lea Bridge Gas Company with Mr. Cross, the Engineer and Manager. He found that this was not an inquiry into an application for electric lighting purposes only, but had been mixed up with a light railway. He thought about £25,000 related to the railway scheme. The notice stated that the inquiry was in regard to a loan for electric light purposes, and this was what he had come prepared to deal with.

Mr. WATSON said for the light railway undertaking they had £180,000 authorized; the cost of the works they were asking the Board to sanction was not contained in that loan. In their application to the Local Government Board, there was a sum of £26,460 for the provision of plant. Out of this they deducted £8000, which had been provided in the Light Railway Order. The Electric Lighting Department would be asked to provide the power; and therefore it would be necessary to go to the Local Government Board for sanction to borrow the money to put them in a position to do it.

Mr. BATTEN then proceeded to protest, on behalf of his clients, who, he said, were very large ratepayers, against the action of the Council in not furnishing to the Local Government Board estimates of the expenditure incurred without authority. He took it that the scheme had been altered without the sanction of the Board, and a much more expensive one adopted, with the result that £17,800 was spent without their permission.

The INSPECTOR said he had made a note of Mr. Batten's point.

Mr. BATTEN next asked for particulars of the £3500 stated to have been realized as profits on the undertaking, and said it was utterly impossible for any profit to be made by the works.

Mr. WATSON said the accounts had been audited, and a return made to the Board of Trade.

Mr. BATTEN inquired how much the Council charged for the public lighting, as compared with the price per unit to private consumers. It was notorious that an excessive charge was made for public lighting in order to show a profit. He submitted that the Council should be subject to some conditions in regard to free wiring.

Dr. S. A. CLARKE, a member of the Council, in the course of a long speech, said it was not his wish to oppose sanction being given to the

money overspent, but he felt that everything in connection with the electrical scheme had been done in a manner to bring about the ruin of the place. As a member of the Council, both in Committee and in public, he had done his best, in spite of everything, to bring forward some of the irregularities, in order that the Local Government Board might take steps to see that things were conducted more regularly in future. As to the £17,800 overspent, it was done without the knowledge of the Council. Having explained how this matter was carried through, he proceeded to deal with the question of profits, and suggested that they were mainly made up by the charge for the public lights; and it seemed extraordinary that they should have to pay £7 15s. per lamp of 32 candles, whereas the Lea Bridge Gas Company supplied incandescent gas-light of 72-candle power, which was twice as good, at £4 per lamp. Enumerating the sums borrowed from the bank, he said they were using something like £70,000 for which they never charged anything. Had they paid back principal and interest on this huge sum, there would not have been a profit, but the ratepayers would have been called upon for thousands of pounds to make up the deficit. Dr. Clarke then proceeded to speak of the money borrowed for free wiring, and said this was the only place where he felt he could get any justice. He then passed on to criticize the Council's expenditure, and cited the following as an example of their business methods: In July last they were spending £5000 for cables, and tenders were asked for. Eight firms tendered, and the lowest was for £75 14s. 6½d.; but the contract was given to other tenderers at £125 17s. 4d., although their offer was not sent in within the specified time. On a contract of £5000, the difference between the tenders would mean more than £2000. He did not oppose so much the granting of this money as everything connected with matters carried on by the Council. When an honest man was associated with a body of this kind, it behoved him to act. It had been his intention to resign, because he felt he could not ally himself with a body of men who worked in this way, when he could see that the work was not done for the benefit of the ratepayer but for his loss, and when he considered that the rates were so exceptionally high, and that there were more than 2500 empty houses in the district. They were driving away the people who occupied £30 houses, leaving those who paid 7s. or 8s. a week; and the rates were bound to go up higher and higher. The poor-rate was now upwards of £3000 more than last year. If the Local Government Board inquired into this scheme from start to finish, there would be some startling revelations.

Mr. F. C. FRAILING said that in many instances of over-expenditure, the lowest tenders had not been accepted. Certain firms obtained contracts whether or not they were the lowest tenderers. He thought with Dr. Clarke, that if the Local Government Board should hold an inquiry, facts would come out which would surprise them.

Mr. W. TYLER, the Chairman of the Finance Committee, said he was an earnest supporter of the electric light. The greater portion of the £17,850 was a legacy the present Council had inherited; and the Inspector would appreciate the position they were placed in. The money had been spent, and the whole of it, with the exception of £4000, had been paid; and the present Council resisted the attempt to pay the balance. They had inherited in addition £9535 for the extension of mains and services; and he would stake his reputation that they could not find resolutions sanctioning six of them. The Council were startled to find £17,800 overspent. Of this sum, £9000 was for these extensions, which no one knew anything about, except, perhaps, the Chairman of the Committee; and they were told that if 12 ratepayers requisitioned they should proceed. Did this mean that their officials were to go on without any reference to the Council? If so, they would wake up one morning and find that they had overspent not £17,000, but perhaps £70,000. In some of the streets cabled there was not a single consumer. The profits were very misleading. The Council were their own largest customer, and could charge themselves what they pleased, and the profit would go on; but a large portion of it came out of the ratepayers' pockets. These were statements which could be easily proved. He thought the Inspector should go carefully into these matters and mark his sense of the way in which the Council had dealt with public money. The last Council spent without taking the trouble to ask permission; and he was there to endeavour to put a stop to this illegal manner of conducting business. He hoped the Inspector would approve the application for the loan, but would show his disapproval of the Council's way of doing business.

Mr. J. FRIEND, the Chairman of the Electric Lighting Committee under the former Council, characterized the statements of Dr. Clarke as "mere air and bubble," and said he was glad of this inquiry in order that they might clear the ground, and hear no more about it. The undertaking had been carried on in a thoroughly proper way. It was a profitable one, and had never cost the ratepayers a half-penny. They showed a profit of £6000 on two years. The extra cost as between electric light and gas had been referred to; but he said this was more than covered, because in five main streets they had arc lamps which gave perpetual moonlight, and friends of his from many places said it was the best they had seen. He admitted that the lighting of the side streets was not so successful as it would be, for he understood they would have a light equal to the incandescent gas-light. But whatever the extra cost had been, it was more than covered by the profit they had made.

Mr. STEWART said he thought, after the statements made by Dr. Clarke and Mr. Tyler, the Inspector would see the necessity for the Local Government Board to hold an inquiry. The ratepayers had great difficulty in meeting the demands made upon them. He saw the necessity for sanctioning the £17,800, as this had been spent. There were roads which had been cabled for 18 months, and not a light was in them. Miles of cables were lying dead.

Mr. H. HINTON said he did not think the Local Government Board could hold a more strict inquiry than the Inspector had done. No doubt the system of spending money alluded to should be stopped. It was an evil habit which had grown up. The borrowing powers of the town must be checked. The inhabitants were being driven out, and those who were left had to pay.

Mr. A. ATTWELL said the statements which had been made were so serious that he was sure the Inspector would give due weight to them in his report. He felt that the money asked for must be provided, and it was only on these grounds that he supported the application now under discussion.

Mr. G. W. BARKER, speaking as an old member of the Council, said he was in favour of the use of the incandescent gas-burner for the side streets as being much cheaper than the electric light. In fact, nothing beat the incandescent gas-lamp.

The inquiry then closed.

ELECTRIC LIGHTING AT HASTINGS.

Clearing off the Deficiency on the Undertaking.

At the last Meeting of the Hastings Town Council, the position of the electric light undertaking of the Corporation was discussed. The Electricity Committee reported that at their meeting held on the 6th ult., they had before them a communication from the Local Government Board, stating that the Board had had under consideration the report made by their Inspector, Mr. H. P. Boulnois, after the inquiry held by him with reference to the application of the Council for sanction to the borrowing of £3416 for purposes of electric lighting; that they observed that the accounts of the Electricity Department of the Corporation for the years 1900 to 1903 inclusive each showed a loss on the year's working; and that only during the last-mentioned year was any sum raised by rate towards meeting these deficits—the deficit carried forward on Dec. 31, 1903, amounting to £4468 8s. 11d. The Board requested that they might be informed what steps the Council intended to take with a view of wiping out the deficit brought forward at the beginning of the present year, and to prevent a recurrence of these deficits. In accordance with the Committee's instructions, the Board were informed that, in addition to the provision of £1500 made in the estimate for the current financial year, the Committee intended to recommend the Council to raise and set aside a similar sum yearly until the deficiency had been wiped out, unless in the meantime, through the more successful working of the undertaking, the revenue should be found sufficient to cover any then existing deficiency. A further communication had been received from the Board requesting that they might be furnished with a copy of a resolution of the Council undertaking to set aside yearly a sum of £1500 for the purpose of clearing off the deficit alluded to; and the Committee accordingly recommended that the Council should undertake to appropriate this amount out of the general district rate.

The adoption of the report having been moved and seconded, Mr. Chesterfield said they had set aside £1500 to pay off the deficit on the electric light works; and he supposed there was no alternative; but he wished to point out they were generating current at 2d. per unit and selling it at 1½d. Yet they wondered why there was a loss. Mr. Boutwood moved, as an amendment, that the report be sent back to the Committee for further consideration, as it was an incomplete answer to the two questions put by the Inspector of the Local Government Board—viz., What they were going to do to wipe off the deficit? and What steps they were going to take to prevent a recurrence of a deficit? Mr. Stredwick, in seconding the amendment, said he was glad the Local Government Board recognized that they ought to stem the torrent of everlasting expenditure. He would be only too glad if the Board would not sanction the loan, because he believed it was entirely unnecessary at the present time. Mr. Cox could not let the opportunity pass without raising his protest against the manner in which these things were conducted; and he warned the Corporation against passing the resolution. They were asked, he said, to put by £1500 per annum towards the deficiency of £4468, which meant that for three years they were to be burdened with this deficiency. They were no nearer the turning of the corner and making the electric light works into a prosperous concern than they were last year. He also wished to protest against the action of the Committee in starting the works before the loan had been actually sanctioned. Mr. Stace repeated what he had said before—that the Council had in the first place given too much for the works. He thought £40,000 would have been ample, instead of paying £54,000 for them, or rather £60,000, as this was what they eventually cost. Mr. Shoesmith suggested that the Council should raise the price to 7d. per unit. If they did, he did not think more than one or two people would have the light cut off. Alderman Langham, who moved the adoption of the report in the absence of the Chairman of the Electric Lighting Committee, having replied, the amendment was lost by 18 votes to 7. Another amendment, postponing the matter until the meeting of the Council on the 21st inst., was also lost, and the original motion carried.

The Shortage of Water in Manchester.—Last Thursday, it was stated that there was only 24 days' supply of water in the Manchester Corporation reservoirs at Longdendale. On the preceding day, only 5 million gallons flowed in to meet an abstraction of 30 million gallons. The Water Committee are somewhat concerned at the large consumption, which they think indicates that the public generally do not realize the seriousness of the situation, and are not trying to economize.

The Gas Question at Nottingham.—With reference to this matter, the following statement appeared in the "Nottingham Daily Express" last Wednesday: "At the Exchange Hall, Nottingham, yesterday morning, a largely-attended meeting of the members of the City Council was held, *in camera*, for the purpose of discussing the rather vexed question of the price and quality of the gas supplied by the Corporation. The Mayor (Councillor Alfred Page, J.P.), who called the meeting in accordance with a requisition from several members, presided. In the course of a discussion on the recently-issued report of the Gas Engineer (Mr. J. H. Brown), some strong complaints were, we understand, made upon the supply of gas; but the Council came to no definite decision on the matter. It was felt desirable that a supplementary report should be presented by the Engineer and the Gas Committee; and eventually the forty or so members present decided to adjourn and hold another private meeting prior to the 1st of November, so that the Gas Committee in the interim may prepare a statement on the question."

METROPOLITAN WATER BOARD.

The Fortnightly Meeting of the Board was held on Friday, at the offices of the Metropolitan Asylums Board—Mr. R. M. BEACHCROFT in the chair.

The Finance Committee reported that they had had under consideration the collection of the water-rate in the several districts of the Board's area. They found that in all the districts, with the exception of the Grand Junction, it had been the practice to collect two quarters' water-rate to Christmas and two quarters' rate to Midsummer, and it would therefore be necessary, in order to make the whole collection terminate on the last day of the Board's financial year—viz., March 31—that an odd quarter's rate to the previous Lady Day should be levied in seven of the districts. They had therefore instructed the Accountant to make all necessary arrangements for the collection of a quarter's water-rate to Lady Day, 1905, in the seven districts in question. Additional expenditure would be incurred over these arrangements; but the Committee were satisfied that no other course was open to them, and they recommended that it should be approved. This recommendation was agreed to. The Committee also stated that they had received from the Croydon Corporation the sum of £225,810 in respect of the transfer of works to them under the powers of the Metropolis Water Act, 1902.

The Finance Committee also submitted a long report on the increases of salary and superannuation allowances granted by the Water Companies between the introduction of the Bill for the Metropolis Water Act, 1902, and the "appointed day" named in the Act. After drawing attention to sections 40 and 47 of the Act, dealing with the matter, the Committee stated that they had carefully considered a return submitted by the Accountant showing particulars of salaries, emoluments, and privileges, and special payments to transferred officers, together with superannuation allowances, granted between Jan. 30, 1902 (the date of the introduction of the Bill) and June 24, 1904 (the "appointed day"). Very considerable alterations of salaries had taken place between the dates mentioned; and it could hardly be denied that, speaking generally, the alterations had been on a liberal scale. On the advice of the Board's Solicitors, the Companies were communicated with on the subject, and an opportunity was given them of justifying their action. Replies had been received from them, and the Committee had carefully considered the information thus supplied, and had consulted the Solicitors thereon. They expressed the strong opinion that the Board would not succeed in maintaining their objections before the Court of Arbitration, and that therefore nothing would be gained by proceeding further. Accordingly, the Committee had resolved to recommend the Board to authorize the withdrawal of the objections.

Lord WELBY, the Chairman of the Committee, moved the adoption of the recommendation. He observed that the objections were not altogether removed by the answers of the Companies, but at the same time it was extremely difficult to be able to state to the Court of Arbitration that the particular increments and advances were not reasonably necessary in the ordinary course of business.

Mr. W. C. JOHNSON moved, as an amendment, that the recommendation should be referred back to the Committee. He considered that, whether they expected to be defeated or not, they should bring the cases before the Court, to show their dissatisfaction.

After some discussion, the amendment was carried by 37 votes to 6.

The Law and Parliamentary Committee reported that they had further considered the question of making temporary arrangements for transacting the ordinary legal business of the Board; and they recommended—"(*a*) That a Law Clerk be appointed to attend to legal business of an ordinary character; (*b*) that the appointment of Law Clerk be held during the pleasure of the Board, and that, subject to the concurrence of the General Purposes Committee, the salary attached thereto be £500 per annum; and (*c*) that it be referred to the Law and Parliamentary Committee to issue an advertisement inviting applications for the appointment and to submit to the Board the names of three suitable candidates." The recommendations were agreed to. The Committee also reported that they had had under consideration the question of whether the Board should promote legislation in the ensuing session, and had decided, for reasons which were set out in the report, that it would be premature to do so.

The Works and Stores Committee drew attention in their report to a fire which occurred at Nos. 41 & 42, Topsfield Parade, Hornsey, on the 27th of August, and resulted in the deaths of two persons. The Committee reported that an inquest was held on the 1st ult. at the Hornsey Coroner's Court, and that the Jury added to their verdict two riders. The first stated that the pressure from the mains was insufficient to enable the water to reach the top of the house; and they strongly recommended the Water Board to maintain, if possible, a uniform pressure, so that the water might, in case of fire, reach the top storeys of buildings. The second rider urged upon the Borough Council the advisability of increasing the number of hydrants throughout the borough. The Chief Engineer of the Board (Mr. W. B. Bryan, M.Inst.C.E.) had inquired into the matter, and in the course of his report stated that the supply from the Board's mains, as regarded both volume and pressure, was excellent; and it was not the Board's duty to keep their works in such a condition as to do away with the necessity of steam fire-engines being employed by the local fire authority. It was decided to forward the report to the Coroner for Central Middlesex.

The Local Government Board have appointed Lord Revelstoke as Arbitrator to decide the question of the amount of compensation to be given to the Directors of the New River and the other London Water Companies by the Water Board on account of loss of office. The inquiry will open on the 26th inst., at the Westminster Palace Hotel. The New River Company's Directors claim ten years' purchase of the annual fees, which amount to about £11,000 per annum. The Lambeth Water Company, whose case is set down next for hearing, put forth their claim for compensation on the basis of Post Office annuities.

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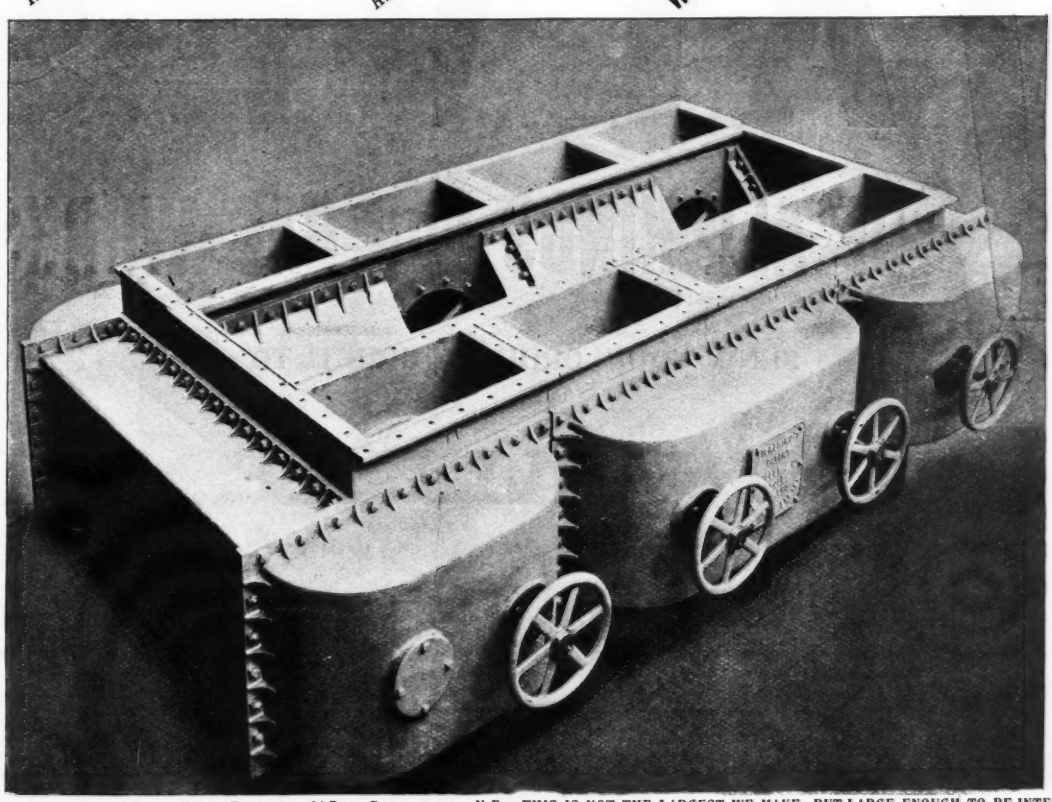

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GRAND JUNCTION WATER-WORKS COMPANY.

The Allocation of the Compensation Money.

A Meeting of holders of "D" shares created under the Grand Junction Water-Works Act, 1878, convened by requisition, was held last Wednesday, at the Company's Offices, South Molton Street, W. Sir ARTHUR T. F. CLAY, Bart., who was stated to be by far the largest holder of these shares, and was formerly Chairman of the Company, was asked to preside.

The CHAIRMAN, at the outset of his remarks, recognized the great courtesy with which the Directors of the Company had met the requisitionists, who, he said, had received every possible facility from them as well as from the Secretary (Mr. J. Goodwin), in connection with the meeting. He and those who were associated with him felt most strongly that in preparing their scheme the Directors had given most anxious thought to it, and with the intention of acting with absolute fairness and impartiality to all classes of shareholders. In calling the meeting, with the object of asking the Directors to refer their scheme for the judgment of the Court, the requisitionists had been strongly supported by very high legal authority. With reference to the points alluded to in the circular, the first was that of the equality of the capital of all the classes of shareholders. This was so purely a legal question that he did not feel competent to pronounce any opinion upon it. On the other question, however—viz., as to the preferential character of the 7 per cent. dividend, and whether this feature had been fully allowed for by the Directors—they were all able to form an opinion. When he spoke of the preferential character of this dividend, he based what he said on section 17 of the Act of 1878, which made it perfectly clear that all classes of shareholders would get their 7 per cent. and then the 7½ per cent. before the "A" and "B" shareholders were entitled to their dividends above these amounts. He understood that the Directors were perfectly willing to submit their scheme to the Court, but that it was a question whether they were legally entitled to do so, holding the balance for all classes of shareholders. He believed that the Board were advised that a majority of the whole value of the "D" shareholders must be in favour of referring the question to the Court, and that otherwise they were not bound to do so. He admitted that this was a possible construction of the words of the Act, but he ventured to say that it was a very strained one; and it seemed incredible, having determined that any one class of the shareholders should have the right of appealing, that a condition should have been put in the Act neutralizing this right.

Mr. WHITWORTH, in proposing a resolution dissenting from the scheme, stated that on purchasing his "D" shares at the first auction, he had been distinctly of opinion that the only preference to which they were entitled was a preference in respect of dividend; and he then thought that in the event of the Company being wound up, he should participate fully with the 10 per cent. shareholders. He maintained that this point ought to have been taken into account by the Directors in framing their scheme. The other point referred to he regarded as very much clearer. The Arbitrators made their award on the assumption that the ultimate amount of the income of the Company would be £110,000; but in 1902 their total earnings were £105,082, and they had never yet earned the £110,000 in a year. In order to pay 7 per cent. to all classes of the shareholders, £91,000 was required; and the difference between that sum and £110,000 went to the "A," "B," and "C" shareholders. The award in the case of this Company was 30 years' purchase; while in that of the Kent Company, who had attained their maximum dividend and were earning a surplus (although the surplus was not divisible among the shareholders), the Arbitrators awarded 33 years' purchase. He did not say that the "D" shareholders of this Company were entitled to that; but he did say that they were entitled to a higher number of years' purchase than was to be paid in respect of the £19,000, the difference between the £91,000 and the £110,000.

Mr. MUIR MACKENZIE seconded the motion.

Mr. BONNOR-MAURICE stated that he was present somewhat in a dual capacity. For many years he had been the Company's legal adviser; but in the remarks he was about to make he spoke simply as a "D" shareholder. He had not received any mandate or instructions from the Directors which authorized him to speak on their behalf. He thought that the "D" shareholders ought to be contented with the Board's scheme as it stood. He desired to show that they were getting all they were entitled to; and he believed that if the course proposed by the resolution were acted on, it would cause considerable delay, expense, and litigation between the classes of shareholders *inter se*. The principle underlying the sale to the Water Board was compensation to the shareholders—an equivalent, that was to say, for what they were losing; and if anyone would refer to the fourth schedule to the Act, he would see that the Directors were instructed to divide the compensation in a manner which was "just and equitable," having regard to the interests of all the shareholders. This was the problem they had had to solve; and he should like to show how they had solved it. For convenience, he would take two shares of £50 each, which made £100. At the present time every holder of two "D" shares received 7 per cent. per annum; and no matter what happened to the Company, he could get no more. The Directors proposed that the holder of two "D" shares should receive £213 cash or £233 8s. 2d. Water Board stock; and the latter, at 3 per cent., would return 7 per cent. If, therefore, he was losing 7 per cent. per annum, he was getting back 7 per cent. per annum. Each holder of two "A" shares was now entitled to get 10 per cent. per annum; and the Directors proposed that he should receive £276 10s. cash or £302 15s. 4d. Water Board stock—the latter, at 3 per cent., returning 9 per cent. per annum. In other words, having regard to the uncertainty which might possibly be assumed to attach to the 10 per cent. dividend, the Directors had given him less; but the "D" shareholders

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were to receive their full 7 per cent. The effect of the scheme suggested by those who had called the meeting was, he understood, that there should be an equal division between all classes of shareholders, giving £256 cash or £280 6s. 5d. stock to the holder of every two shares. In other words, the "D" shareholders, who could never have had more than 7 per cent. if the Company had gone on, were to receive £8 8s. per cent. Surely this was not a "just and equitable" distribution of the compensation. As a "D" shareholder, he was contented. He believed he was to receive all the compensation to which he was entitled; and he did not like going into the unknown to get more, to which he did not think he was morally entitled, with the chance that questions might be raised as to the proper distribution with the "A" and "B" shareholders, with the possible result that the latter might get more, and the "D" shareholders less, than the Directors proposed that they should receive.

The CHAIRMAN, in reply, observed that the question before the meeting was not so much whether the "D" shareholders had to complain of anything, as whether or not the scheme arrived at by the Directors, in perfect good faith, was really a proper one. Mr. Bonnor-Maurice had stated that if the "D" shareholders got an assured 7 per cent. per annum, it was all they could ask for; and that the "A" shareholders, who were entitled to 10 per cent., would only get 9 per cent. There was, however, no right to assume that the "A" shareholders would get 9 per cent.; and their getting this rate was based on the assumption that if the Company had gone on the "A" shareholders would have received 9 per cent. in perpetuity. But there was no authority for this supposition; on the contrary, the evidence, he maintained, showed that if the Company had gone on, it was extremely unlikely that the "A" shareholders would have obtained anything like 9 per cent. He and those associated with him therefore contended that the Directors were wrong in allocating compensation to the "A" shareholders on a 9 per cent. basis.

The motion was then put, and declared to be carried.

Mr. BONNOR-MAURICE demanded a poll, and it was at once taken.

The CHAIRMAN afterwards moved a resolution appointing a Committee (with power to add to their number), consisting of himself, Mr. Edwin Fox, Mr. Justice Bray, Mr. L. E. Raphael, Mr. R. Wright Taylor, Mr. W. Whitworth, and Mr. William Wright, to take all necessary steps to carry the resolution into full effect, and to promote and defend the interests of the holders of "D" shares in the Company in relation to the Directors' scheme.

Mr. GASKELL seconded the motion, and it was carried.

The CHAIRMAN next proposed a resolution giving the Committee full power to take such proceedings as they might think fit; and it was declared to be carried, with two dissentients.

At the close of the poll,

The CHAIRMAN announced that the holders of 1354 shares had voted in favour of the resolution, and that the holders of 169 shares had voted against it. Proxies representing 318 shares had also been given in favour of the resolution, which was therefore carried by a very large majority. There remained, however, the interpretation of the fourth schedule to the Act. If the interpretation put upon it—that it required a majority in value of the whole of the "D" shares—were correct, they were short of the number to a considerable extent. But if, as they were advised, it was not correct, they would have carried their point.

The meeting then closed.

A meeting of the "A," "B," and "C" shareholders was subsequently held, Lord Knutsford presiding, in the absence, through severe illness, of Mr. F. Tendron (the Chairman of the Company). The Chairman explained the action taken by the Directors to give effect to the award of the Arbitrators, and stated that the Board had had but one object in preparing their scheme—that of dealing with the four classes of shareholders fairly and, as they considered, most in accord with the justice of the case. The resolution passed at the meeting of the "D" shareholders—which was, of course, hostile to the Directors' scheme—was one which the Board were advised was not valid within the meaning of the fourth schedule to the Metropolis Water Act, 1902. The matter, however, would be one for the Court to decide. He suggested the advisability of passing a resolution to appoint a Committee to act on their behalf in any proceedings that might be taken. Dealing with the scheme, he stated that the principle upon which it was based was to be found in the 17th section of the Act of 1878, which provided and regulated the payment of dividends; and the Directors' proposals were in strict accord with this Act. After the Chairman had replied to a few questions, a resolution was passed appointing a Committee of three (with power to add to their number) to represent the "A," "B," and "C" shareholders, and to promote and defend their interests. Mr. I. A. Crookenden, Mr. F. Schooling, and Mr. Whittington were afterwards appointed members of the Committee, and the proceedings terminated.

DEVONPORT WATER-WORKS ARBITRATION.

With reference to the arbitration to determine the price to be paid by the Devonport Corporation for the purchase of the Devonport Water Company's undertaking, a report was submitted to the Council on Thursday explaining the present position of the matter. It refers to the resumption of the proceedings on July 23 last by Mr. A. J. Ram, K.C., the new Arbitrator, which were reported in the "JOURNAL," and explains that, as the questions of the right of the Company to claim back-dividends and also an additional 1 per cent. on the then preference stock has been left to the Umpire, the only point remaining on which he will state a special case is the one dealing with the supply of water to the Admiralty. Since the Umpire submitted his draft award in blank, the observations of the Corporation with regard to it have been submitted to the Water Company, and those of the Company to

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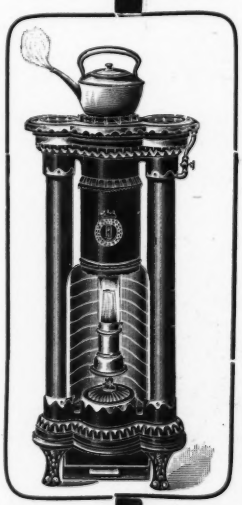

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the Corporation. The Corporation objected *in toto* to the Company's observations. By agreement with the Company, the time for making the award was extended until Dec. 23.

Speaking at a public meeting at Devonport last week, Mr. J. C. Tozer, a member of the Corporation, said the question of the Admiralty supply would considerably affect the price to be paid for the water undertaking; and there would probably be three appeals—first to the Divisional Court, then to the Court of Appeal, and finally to the House of Lords. He did not think it was possible for the transfer of the works to take place in less than eighteen months or two years. Mr. Jarvis, another member, expressed the opinion that many who voted for the purchase would regret it when they knew the cost.

EXTENSION OF THE BATH WATER-WORKS.

Inaugural Ceremony.

The Mayor of Bath (Major C. H. Simpson) performed last Friday the inaugural ceremony in connection with the latest extension of the Bath Water-Works, which has been carried out, and lately completed, at Oakford, in the St. Catherine's Valley. A large party, mostly members of the Corporation, were invited to be present by the ex-Mayor (Alderman J. E. Henshaw), who is Chairman of the Water Committee. The company included Mr. W. Fox, the Engineer, and Mr. G. G. Lynge, who represented Messrs. Edmunds, Nuttall, and Co., of Manchester, the Contractors. The work has cost upwards of £40,000, and the principal thing that can be seen is the collecting tank at Oakford, which holds 500,000 gallons, and is at a convenient spot for receiving the water from the additional springs which have been tapped for the necessities of the city and its suburbs. The tank, which is circular in shape, is 105 feet in diameter, and has a depth of 14 feet. It is built of blue brick, backed by concrete and puddled clay, with a slight incline on the sides. The bottom is lined with concrete. At the south side there are the outlet and straining-well through which the water passes before it enters the 18-inch main, which has been laid from the tank into the city and up to the Beechen Cliff reservoir. There is a 12-inch main connecting the new conduit with the Batheaston reservoirs, so that it can carry into the city the overflow from this centre of collection; and as the new Oakford basin is at a lower level than the Batheaston reservoirs, water from them can be passed into the new receiver should it ever be found necessary or advisable to do so. At certain points in the city, connections with the new main have been made with the view of relieving the Batheaston supply as occasion may require. The scheme is calculated to increase the city's supply of water by 180,000 gallons daily in the driest weather; making, with 140,000 gallons which represent existing sources, sufficient for 75,000 people at the rate of 23 gallons per head per day. The average consumption for some years past has been considerably less than this.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The meeting between the Edinburgh and Leith Gas Commissioners and deputations of traders last Monday, upon the subject of the Commissioners engaging in trade, is a question of some importance, on account of the effect which it may have upon the action of the Commissioners. A report of the meeting is given elsewhere [see p. 190]. But I think there will be agreement with the observation that, if anything does result from the proceedings, it will be the outcome of an innate delicacy on the part of the Commissioners in their treatment of the traders, rather than in any degree due to what was brought forward by the deputations. Their case was either very weakly presented, or they had no case to present. It was not sufficient to establish that the sale of the goods of one firm had declined, and to leave out of account the advances which have been made by other firms. Yet this was all the deputations attempted to do. Their conversation otherwise was on general principles, upon which a Commission for the greater part composed of traders may be expected to be largely with them. It has to be noted that the deputations were by no means in the same boat; for while the general merchants were downright against all trading on the part of the Commissioners, the ironmongers and plumbers were not averse to their dealing in stoves and fires, provided the traders got discount upon sales effected through them. There would be more difficulty in regard to hires; but this should not be an insuperable one, provided safeguards were made against an extensive practice of returning appliances. But such an arrangement could not be made to touch the question of the supply of fittings. The policy of dealing in fittings is one which must be either given up, on the general principle of no trading, or be dealt with on business principles. In choosing one of these courses, the Commissioners will probably not forget that if the general principle is to be applied they must go further than the question of the supply of fittings, for they already supply and fit service-pipes to the outer walls of buildings free of charge. There is no difference in principle between their doing this work and going inside the premises and fixing up gas appliances. The questions which have been raised will very much depend upon the good-will of the Commissioners; and in this connection satisfaction may be expressed at the assurance which was given to the traders that the Commissioners have no desire to injure them in their businesses.

Another new gas-works—that at North Berwick—has been added to the list in Scotland. Within twenty months there have been six—Granton, Newport, Ardrossan, Kilmarnock, Provan, and North Berwick—which is at the rate of one every fourteen weeks. North Berwick was sadly in need of new gas-works. A glance at the old ones was sufficient to convince anyone at all acquainted with the conditions of gas supply of that. The opening day was a beautiful one, making outward conditions agreeable; while the kindly reception and generous

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hospitality of the Corporation were elements which made the comfort of the visitors complete. Then as to convenience of situation, little better could be desired, because the railway runs past the gable of the coal-store and a siding has been brought into the works. The design of the works is simplicity itself; a feature of them being that the gas, from the time it leaves the retort, always goes forward. The plant is the selection of Mr. J. M'Gilchrist, the Engineer, which is, in itself, a sufficient guarantee that the best apparatus has been chosen for efficient and economical working in works of the size. The Commissioners and community of North Berwick are to be congratulated upon the beautiful gas-works they now possess, and upon the prospect which they have before them. They have had a most auspicious opening at the hands of Mr. R. B. Haldane, the Member of Parliament for the county. The only regrettable feature of the opening ceremonial was that no place was found in it for Mr. J. Black, the capable and attentive Manager who will have charge of the works. Perhaps it was his own choice; but I am sure everyone would have been delighted to see him taking some part in the day's proceedings.

The Broughty Ferry Town Council have hopes that they will be able to pull themselves out of the financial trouble they have got into in connection with their gas undertaking; but they have become aware of a very obnoxious fly in their pot of ointment, in the shape of someone who has given erroneous information to the local newspapers. At a monthly meeting of the Council on Tuesday, Provost Gray said that he and the Town Clerk had gone to London, where they had a long and friendly interview, at the Scotch Office, with the official who has charge of their business. They had every reason to believe that they had been able to make a satisfactory arrangement; but until it was approved by the Secretary for Scotland, they had no right to say that it was settled. One thing, however, was finally fixed, which was that the price of gas was not to be increased this year; and he believed that there would be no increase afterwards in the price of gas. In the Provost's opinion, if they had a good year's working, they were not likely to hear more about the matter. But that is what the Corporation are not experiencing. Mr. Crystal, the Convener of the Gas Committee, called attention to the decrease in the consumption of gas that is going on. At the meeting of the Committee a month ago, he reported that the output was gradually approaching that of the corresponding period of the previous year, and expressed the hope that he would be able this month to report that it was as large. But the day following their last Council meeting, the newspapers published alarmist reports, based on erroneous information supplied by a member of the Council, and indicating that, owing to the Secretary for Scotland's disapproval of the Council's methods of finance, the price of gas would require to be raised to 5s. per 1000 cubic feet. The effect had been disastrous. The next day consumers appeared at the gas-works, and asked to have their meters removed. He wished the Council to give an authoritative denial to the report which had been circulated, and to assure the public that if the gas consumption were maintained, it was hoped that the present rate of 3s. 6d. per 1000 cubic feet would not be exceeded for years to come. Mr. Crystal having mentioned the name of Mr. Westwood as the member of the Council who was suspected of having given information to the newspapers, that gentleman created somewhat of a scene by declaring and reiterating that it was "a lie." He did not repudiate having given information, but maintained that it was correct. This will probably be matter of opinion; but there is no doubt that Mr. Westwood has been a prominent individual in the agitation regarding the finances of the gas undertaking.

A more than usually disastrous explosion of gas occurred in Tay Square United Free Church, Dundee, on the evening of Saturday last. Mr. J. Burrows, the organist, entering a waiting-room in the rear of the building, noticed a strong smell of gas. He opened the outer door and a door leading into the church, and waited several minutes, to allow the air to clear. Then he lighted two jets of gas upon a bracket, and was descending the stair leading to a cellar. When he had got only two steps down, a violent explosion occurred in the waiting-room. Mr. Burrows was hurled down into the cellar, but escaped with comparatively few injuries. It is estimated that the damage caused will amount to about £300. Mr. A. Yuill, the Gas Engineer, made an inspection of the building, and is satisfied that the escape of gas was from a gaselier which had been pulled too far down.

The Hamilton Town Council on Tuesday discussed the subject of wages paid to workmen other than stokers in the gas-works. The Gas Committee recommended that the men get an increase of 1s. 6d. per week—men receiving 24s. to get 25s. 6d., and men receiving 26s. to get 27s. 6d.; also that the plumbers employed by the Corporation should be offered the same terms and conditions of pay as were received by men employed by private employers in the burgh. Bailie MacHale, the Convener, moved these recommendations. After some discussion, the recommendation of the Committee was agreed to,

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 15.

Sulphate of Ammonia.

Demand continues to be well sustained; and again there has been a slight improvement in values—the closing quotations being £11 17s. 6d. per ton f.o.b. Hull, and £12 1s. 3d. to £12 2s. 6d. per ton f.o.b. Liverpool and Leith. Although production is sensibly increasing, all available parcels have found a ready market, and there is nowhere any accumulation of stock upon which to draw. The Continent has begun to show some interest, but rather in the forward than in the prompt position. For delivery up to the end of the year, £12 5s. is quoted. Though some makers have advanced their prices, there are still sellers of January-June, 1905, at £12 10s. per ton f.o.b. Leith; while buyers are bidding close upon the price unsuccessfully. April-September has again been sold at £12 5s. per ton f.o.b. Leith.

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LONDON, *Oct.* 14.

Tar Products.

Markets generally have been fairly firm, and as a rule show signs of an improved demand. Some 90 per cent. benzol has again been sold at 9½d. per gallon f.o.b. London; while in 50-90 per cent. business has been done at 7d. in the North for home consumption. The position of anthracene remains unchanged. There are still rumours of a large business being in process of negotiation for delivery all over next year; but particulars have not yet transpired. As regards prompt delivery, the market is very dull, and consumers appear well supplied and perfectly indifferent as to the state of the market. Solvent naphtha is in fairly good demand for home consumption, but as regards export there is certainly an absence of inquiry. Crude carbolic acid continues very firm. There has been a good business doing at 2s., but only for October-December delivery, as at present consumers decline to purchase over the first six months of next year. Crystals continue quiet, although there is more inquiry. It would seem that the German producers are securing all the orders at under the figures quoted by English makers. In creosote, the demand in London appears fairly good for export; but the trouble in obtaining barrels renders business very difficult. In the North, prices are rather easier, and there is certainly more offering in the Yorkshire and Lancashire districts, both for prompt and forward delivery. A good deal of business is reported in pitch during the past week, and generally at improved prices, especially for forward delivery. As regards South Wales, the demand is fairly good for prompt delivery; but consumers will not purchase forward at the equivalent of existing prices. On the Continent, the prices quoted are still quite out of proportion to those ruling here. According to the latest news to hand, the price of pitch has decidedly an upward tendency; for, following the sale of several thousand tons at 28s. 6d. reported last week, we are informed that a London maker has now obtained 29s. 6d. for a good quantity, alongside their wharf.

The average values during the week were: Tar, 17s. 6d. to 20s. 6d.; pitch, London, 28s. 6d. to 29s. 6d.; east coast, 27s. 6d. to 28s. 6d.; west coast, 26s. 6d. to 27s. Benzol, 90 per cent., 9½d. to 9⅝d.; 50-90 per cent., 7d. to 7¼d. Toluol, 6½d. to 6¾d. Crude naphtha, 2⅞d. to 3d.; solvent naphtha, 8d. to 8½d.; heavy naphtha, 10d. to 10½d. Creosote, London, 1⅜d. to 1 11/16d.; North, 1¼d. to 1 5/16d. Heavy oils, 2d. to 2 1/16d. Carbolic acid, 60 per cent., 2s. Refined naphthalene, £4 10s. to £8; salts, 21s. to 22s. 6d. Anthracene, "A" quality, 1¾d. to 2d.; "B" quality, 1d., nominal.

Sulphate of Ammonia.

The market is decidedly firm; and there appears to be a very good inquiry all round. At Beckton, the nominal price is £12 5s.; but the Gaslight and Coke Company do not want to sell anything for November-December delivery, and are not quoting further forward. The South Metropolitan Company state that they are not at the moment sellers in any position, preferring to wait for further developments. Business in Hull has been done during the past week at £12, and in one instance £12 1s. 3d. was actually paid. In Leith, a very fair business was done at the commencement of the week at £12; while later on it is reported that as much as £12 1s. 3d. was paid for early delivery. There is a strong inquiry forward, and £12 10s. is reported to have been paid in one instance for January-June next year. In Liverpool, the demand is very strong, and several parcels are reported to have been placed for prompt delivery at £12.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The output of coal from the Lancashire pits is quite sufficient to meet current demands in every department, with an overplus for any excess of trade that may turn up. On the whole, trade is better. The miners are kept at work, with fair prospects of continuance of labour. The demand for house fuel has not increased so much as had been expected. The improvement in the cotton trade stimulates the demand for engine fuel; and advantage has been taken of the low prices to conclude contracts with the coalowners for long periods, some extending over 1905. There is not much doing in coke; and cannel is only in moderate request. The larger contracts for cannel were concluded in the summer months; and as the days grow shorter, increased deliveries are going out. Forge coal is steady. Coal for export has shown a fair increase. The Partington and Cadishead tips on the Ship Canal have latterly been exceptionally busy. One vessel alone has just shipped 5000 tons for Buenos Ayres. The coalowners of West Yorkshire have endeavoured to advance the price of house coal 1s. per ton; but the advance has not been general. The effect has been to give a stimulus to the sale of East Lancashire coal. Should the Yorkshire colliery proprietors succeed in maintaining an advance in prices, Lancashire would be sure to follow. At present, there is no change to report in prices, which are as follows: Best house coal 13s. to 14s. per ton at the pit, seconds 11s. to 12s., and common 9s. to 10s. Steam and forge coal, best qualities, is 8s. to 8s. 6d., common 7s. 6d. to 7s. 9d., best slack 6s. to 6s. 6d., and common 4s. to 4s. 6d.

Northern Coal Trade.

There is a rather better demand for coal; but some of the collieries have had difficulty in keeping their pits at work, owing to the lack of ready tonnage. In the steam coal trade, the demand is fair, though that for the Baltic begins to fall. Best Northumbrian steams are 9s. per ton f.o.b., second-class 8s. 3d., and steam smalls from 4s. 3d. to 4s. 9d.—the latter kind being relatively the most in demand. In gas coals there is a steady inquiry. Deliveries on long contracts are now much heavier than they were; while there is a little pressure to

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
BLACKBURN	1,250,000	ST. CATHERINES (Remodelled)	250,000	TONBRIDGE	300,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	STRETFORD	800,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	OLDBURY	300,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	TODMORDEN	500,000
BIRKENHEAD	2,250,000	ST. CATHERINES (2nd Cont.)	250,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	YORK (Second Contract)	750,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	ROCHESTER (Second Contract)	500,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	NEWPORT (MON.)	250,000
HALIFAX	1,000,000	YORK	750,000	TOKIO, JAPAN	1,000,000
TORONTO	250,000	ROCHESTER	500,000	PERNAMBUCO (Brazil)	125,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	MALTON	150,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	DULUTH, MINN. (2nd Cont.)	300,000
MONTREAL	500,000	DULUTH, MINN.	300,000	BROCKVILLE (ONT.)	250,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	SMETHWICK	500,000
BELLEVILLE	250,000	LEICESTER	2,000,000	GRAVESEND	300,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	NEWPORT MON. (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	TORONTO (Third Contract)	750,000
		BURNLEY	1,500,000	TORONTO (Fourth Contract)	1,000,000
		KINGSTON-ON-THAMES	1,750,000	MONTREAL, ONT. (2nd Cont.)	1,800,000
		ACCRINGTON	500,000	HAMILTON, ONT.	400,000

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.

AND, IN ADDITION, 4,000,000 CUBIC FEET DAILY; also Coal-Gas Plants at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.

get quantities sent to the upper Baltic ports before the close of the season. The current quotation for Durham gas coals varies from 7s. 10½d. to 8s. 3d. per ton f.o.b., according to contract. Coke is quiet; but the fact of long forward sales for export having been made for gas coke steadies the market. About 13s. per ton is the f.o.b. price for good gas coke.

Scotch Coal Trade.

A better feeling still pervades the market; the demand being slightly better than the supply. Work is plentiful in the pits; and the miners are likely to remain contented, and not to go to extremes upon the wages question. This expectation gives a better outlook for the winter. It cannot be said, however, that prices have yet advanced. The quotations are: Main 7s. 6d. to 7s. 9d. per ton f.o.b. Glasgow, ell 8s. to 9s. 3d., and splint 8s. 9d. to 9s. The shipments for the week amounted to 231,834 tons—a decrease of 14,080 tons when compared with the preceding week, but an increase of 4636 tons on the corresponding week of last year. For the year to date, the total shipments have been 8,915,079 tons—an increase of 272,245 tons upon the same period of last year.

Acetylene Explosion at Erdington.—A few days ago, Mr. Walter Garland, Inspector of Lamps to the Erdington District Council, was engaged in testing an acetylene generator, when an explosion took place. The generator was smashed, and the top of it struck Mr. Garland with great force across the forehead, causing a severe wound.

Water Scheme for Mansfield.—A meeting in committee of the Mansfield Town Council has been held for the purpose of considering a proposed new water scheme at Clipstone; and it has been resolved that application shall be made in the next session of Parliament for power to construct works as supplementary to the present ones at Rainworth, at an estimated cost of about £32,000.

The Cost of the Cray Water Scheme.—At a meeting of the Swansea Water-Works Committee last Wednesday, the Sub-Committee reported that 700 men were engaged on the Cray works, and that during one week in September 3034 cubic yards were added to the dam. It was agreed to apply for parliamentary sanction to raise £124,500 to complete the works, and construct a second line of pipes.

Derwent Valley Water Board.—The balance-sheet of the Derwent Valley Water Board for the year ending Dec. 31 shows that up to the end of last year £547,204 had been expended; and a supplemental account up to July 31 indicates that this amount has risen to £660,773, of which £56,484 has been spent on the construction of the Howden dam. The Derwent dam accounted for £54,826, and land purchase for £137,080. It has cost £4227 to ascertain the rainfall.

The Electric Lighting Question at Ormskirk.—At a meeting of the Ormskirk and District Tradesmen's Association last Wednesday, Mr. C. F. Ellis asked for an expression of opinion on the subject of electric lighting in Ormskirk. He moved that the Association petition the Local Government Board to refuse their sanction to the Board of Guardians borrowing money for carrying out the electric lighting scheme they have adopted; and the motion was unanimously carried.

Tees Valley Water Board.—The accounts of the Tees Valley Water Board show that the capital expenditure for the half year to Aug. 13 was £97,212, bringing up the total cost of the undertaking to £2,399,845. The income was £50,297; being a decrease of £501 as compared with the preceding half year, and an increase of £1904 over the corresponding period of 1903. The balance carried to net revenue was £40,151, as compared with £40,943 3s. 4d. in the previous half year, and £39,001 in the same half of 1903. The net revenue account was debited with several payments for interest, and was credited with the interest allowed by the bank. After being dealt with in this manner, there remained a balance of £61,569.

Cost of Incandescent Lighting at Bolton.—There was some discussion at the last meeting of the Bolton Town Council with reference to the public lighting of Tonge and other out-districts. Mr. Tootill remarked that they had left it to the consideration of the Superintendent as to the best means of lighting to be adopted; and he asked whether or not incandescent gas-lamps were to be introduced. The information furnished to the Gas Committee was that this method was on the whole cheaper than the ordinary one. He had wondered why the added areas had not taken this matter more seriously into their consideration, and adopted the system on the main roads. Mr. Higson said that, in localities which were exposed to gales, the mantles were often carried away. He thought the Hulton district could give an experience of this. Alderman Park stated that the cost was also heavier. The Deputy-Mayor said the defect might be in the lanterns, as regarded the effect of the wind; and he pointed out that windproof lanterns could be obtained. Mr. Eckersley added that the cost was 40 per cent. more, and there was 100 per cent. more light.

Electricity Not Favoured at Newcastle (Staffs.).—It appears that electricity has not many supporters among the members of the Newcastle (Staffs.) Town Council; for in answer to a question as to whether any provision had been made for the future lighting of the principal streets by electricity, Mr. Elliott replied that it was not probable that in the near future the Council would undertake the expenditure of about £1000 in laying down plant for lighting the streets with electricity. The town was already as well lighted as any in the district. Anyone who had had experience in public lighting must have found that, especially in foggy weather, gas was preferable to electricity. The Mayor (Sir A. Seale Haslam, M.P.) observed that if the Corporation considered the interests of the ratepayers, they would let alone lighting the streets with electricity. He had had a good deal of experience in these matters; and in all cases that had come before him it had been found that the cost of electricity was considerably in excess of gas in the matter of public lighting. It would not be wise to put any additional burden on the ratepayers in this way, and he strongly urged the members not to entertain any such proposal. Alderman Heath pointed to the case of Liverpool, where they had abandoned electricity for street lighting, and returned to gas with incandescent mantles, which was far better than electricity.

PARKINSON'S GAS-FIRES.

THE "CROWN."

Elegance.

Efficiency.

See our Exhibit, Stands Nos. 22/29, at the International Gas Exhibition, Earl's Court, Nov. 19 to Dec. 17.

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(PARKINSON BRANCH),

COTTAGE LANE, CITY ROAD, LONDON. | BELL BARN ROAD, BIRMINGHAM.

Large Holder for the Milwaukee Gas Company.—We hear from the Vice-President and General Manager of the Milwaukee Gas Company (Mr. E. G. Pratt) that the Company have just entered into a contract with the Riter-Conley Manufacturing Company of Pittsburg (Pa.) for a large gasholder. The diameter of the tank will be 225 feet, and its depth 35 feet; and some 5000 piles and nearly 5000 cubic yards of concrete will be used for the foundations. The holder will have five lifts, and will be guided by 28 columns, each 175 feet in height; while its capacity will be 6,150,000 cubic feet, or double that of the existing holder. The contract time for completing the work is Nov. 1, 1905.

The Abatement of Smoke.—Lecturing before the Sheffield Health Association last Friday on "Light and Sanitation," Sir James Crichton-Browne referred to the smoke nuisance in cities. He said that over every town hung a canopy of mist and noxious vapour more or less dense, veiling the sun and shutting off much of his beaming influence. A sable incubus embarrassed the breathing, a hideous scum settled upon the skin, a swart awning offended the vision, a sullen cloud oppressed the spirits; and people tolerated it, apparently having come to regard it as inevitable, and as a penalty inseparable from industrial prosperity. But it was not. It was certain that smoke was to a large extent the offspring of culpable negligence and profligate waste, and that it could be enormously abated, if not abolished. It was, he believed, to gas and electricity that they must look for its abatement.

Dissatisfaction with the Electric Light at Coventry.—In a letter to the "Coventry Herald," a ratepayer complains of the electric light. He says: "My experience is that where a year or two ago four lamps would supply the light I want in a certain room, I now require six, and so on in proportion. At times the light is little more than a red glow, and I am told that when this is the case the amount of electricity registered against me is actually greater than when the lamps are giving their full lights; so that I am a loser in two ways. That the light can be supplied is shown at times by the occasional spurts with which we are treated, and quite dazzled. It has been explained to me that the producing power of the plant is not equal to the demand; but if this is the case, I should have thought it would have been more honest to refuse to take additional customers than to supply them at the expense of the old ones. At any rate, I know a great many people who are of my opinion on the subject, and who, like myself, are beginning to wish they had never had anything to do with the electric light in Coventry."

Bideford Water Supply.—A report presented to the Bideford Town Council last week showed that though the consumption of water during September was only 2,819,000 gallons, compared with 3,977,000 gallons in the corresponding month last year, the quantity in the reservoir had fallen to 3,552,000 gallons. The Water Committee recommended that the water should be turned off from 9 p.m. to 5 a.m. Mr. J. J. Lamerton, supporting this recommendation, said the town was within measurable distance of a water famine. Mr. W. Friendship said they could get plenty of water by arrangement with the Northam Council, whose main came within 20 or 30 yards of the Strand. The Water Committee, reporting on the deficiency of the supply, recommended that before arranging anything with the Council, expert opinion should be obtained with reference to the possibility of stopping the leak, increasing the capacity of the reservoir, and altering the filter-beds so as to give a satisfactory pressure in the higher parts of the town. The Mayor (Mr. E. J. Tattersill) said it would require an outlay of £1000 to make the connection with the Northam mains, and the cost of the water would be £200 a year; while the pipes in Bideford would have to be renewed to stand the pressure. It was decided that an expert should be consulted on the subject generally.

Dispute over a Gas-Works Boundary.—A rather remarkable discussion took place at a meeting of the Okehampton Charity Trustees last Tuesday with reference to a new wall which had been built enclosing part of the site of the gas-works. The Surveyor (Mr. J. A. Lucas) said the line of the wall was marked out in his presence. He was assured that the land belonged to the Gas Company, and he thought a most desirable improvement had been effected. The Mayor (Mr. W. Rowe) said he was present when the line was marked out, and objected to the proceedings. When the foundations were being dug, the Town Clerk served notice on the Secretary of the Gas Company, the Contractor, and the Clerk to the Charity Trustees, requiring plans of the proposed alteration to be laid before the Town Council. The notices were ignored. On Saturday morning, he met the Surveyor, and was given an assurance that this work should be stopped at dinner time. Relying upon this he refrained from calling a meeting of the Town Council, as he had been asked to do, and was surprised in the afternoon to find that, instead of stopping the work, the Surveyor had actually put more men on it. The land enclosed was taken over by the Town Council some years ago; and he felt sure the Council would take action. The Surveyor said he had no desire to shirk responsibility. It was decided, on the casting vote of the Mayor (who presided), to write to the Town Council acknowledging that an encroachment had been made, and asking what they required to be done in the matter.

The Chemical Engineering Company and Wilton's Patent Furnace Company are to supply and erect a sulphate of ammonia plant for the Kilmarnock Corporation Gas-Works; also for one of their round open saturators for the Cirencester Gas Company, Limited.

Messrs. Falk, Stadelmann, and Co., Limited, have brought out some new fancy shadowless reflecting shades for use either with the Jena normal chimneys or straight chimneys on incandescent burners. They are to be known as the "Atlas" shades; and will be supplied with a brass holder. They are very pretty, and make an effective combination with ordinary incandescent fittings. They can be had in opal with ruby, green, blue, or yellow edge; in crystal manography, and (if desired) shaded in different colours; crystal etched; rose, old gold, or yellow shaded, satin finished, with clear moulded pattern; and in three or four other tasteful forms. On the "normal" glasses, the shades can be used without the holder, if preferred.

The "MAIN" Gas Cooker

WITH LATEST DEVELOPMENTS.

SPECIAL FEATURES.

OUR NEW PATENT ENAMEL is guaranteed free from Lead or other Poisonous Chemicals.

Inside Fittings, Porcelain Enamelled.

Can be supplied with Moveable Burners, if desired.

R. & A. MAIN, LTD.,

LONDON: 49, Queen Victoria Street. | **GLASGOW:** 26, West Nile Street. | **FALKIRK:** Gothic Works.

The Edinburgh and Leith Gas Commissioners have placed with Messrs. Andrew Barclay, Sons, and Co., Limited, of Kilmarnock, the order for the 16-inch locomotive recently advertised.

The Belfast Gas Committee have agreed to grant an honorarium of £100 to Mr. Sharpe "as an expression of goodwill from the Committee for the manner in which he discharged his duties during the prolonged absence of Mr. Stelfox owing to serious illness."

While Mme. Albani was singing in Dublin last Saturday afternoon, the electric light failed, and the solo had to be finished in darkness. After singing an encore, still without light, the famous singer, when retiring from the stage, tripped on a badly laid carpet, fell heavily, and was severely shaken.

A fire broke out last Sunday night at the works of the Gaslight and Coke Company in Embden Road, Fulham, in a building of three floors, extending 60 feet in one direction and 40 feet in another, used as oil-stores. In the course of an hour the fire was successfully overcome; but the building was practically destroyed.

According to a letter addressed by Mr. F. J. Jervis-Smith, of Trinity College, Oxford, to "Nature," the gas-engine dates back to the year 1820, when an internal combustion motor was shown in operation at Cambridge. It was the invention of the Rev. W. Cecil, Fellow of Magdalen College, Cambridge; and a full account of it is given in Vol. I. of the "Proceedings" of the Philosophical Society of that city.

Under the title of the Premier Light, Limited, a Company has been formed with a capital of £3000, in £1 shares, to carry on the business of manufacturers, importers, and exporters of, and wholesale and retail dealers in, incandescent and other lamps, burners, mantles, and all apparatus and appliances used in connection with the employment, supply, generation, and distribution of gas and electricity. There will be no initial public issue.

The Metropolitan Water Board intend issuing about £2,000,000 of their water stock early in November. This is the balance left unissued after the price is paid for the undertakings of the London Water Companies, and it is required for the payment of arbitration costs and generally for current expenses, including the compensation to the Directors of the various Companies. To determine the amount of the latter an arbitration is shortly to be held, as mentioned elsewhere.

In the description of the Frankley reservoir and filter-beds of the Birmingham Corporation which appeared in the "JOURNAL," last week, it was mentioned that Messrs. Glenfield and Kennedy were the makers of the machinery. This statement was correct so far as the pumping-engines are concerned; but we learn that all the sluice-valves, penstocks, and the hydraulic cylinders and valves for working them, were made and supplied by Messrs. J. Blakeborough and Sons, of Brighouse.

Two Local Government Board inquiries were held last week at Whaley Bridge to determine the charges for water supplies to houses in Whaley Bridge, Fernilee, and part of Chapel-en-le-Frith. Whaley has expended £7500 on water-works, and Chapel-en-le-Frith £9000; and both have a scale of charges in operation which is supplemented by the district rate. The Inspector pointed out that the Local Government Board considered the consumers themselves should pay all costs where possible.

At the annual meeting of Messrs. S. A. Sadler and Co., held at Middlesbrough last Friday, Colonel Sadler, M P., the Chairman, said the business had increased during the year, and a large profit had been earned; but £7000 having been spent on improving the plant, it was deemed wise not to pay any dividend. The benefit of the improvement was being realized; and an interim dividend for the ensuing year would be paid. The prospects were bright; the order-book for next year being a record.

The present season's gas-fire booklet which the Richmond Gas Stove and Meter Company, Limited, have produced for distribution by gas companies and corporations, possesses the first requisite for inducing people to open it, and that is an artistically designed cover, by Mr. Charles E. Dawson. There is a vacant space on the back of the cover in which the firm will have printed the names of gas companies and corporations, the hire rates (if any) of fires, or the prices of fires, if sold for cash.

The lamplighters in the service of the Exeter Gas Company were recently entertained at supper by the Directors at the Barnstaple Inn. Mr. W. N. Westlake was in the chair; and in responding to the toast of "The Directors," which was cordially honoured, pointed out that incandescent gas was the light of the future. He spoke with pride of the successful lighting of Heavitree by this system at less cost than the electric light, and advocated the illumination of the streets and courts of Exeter by this means as being more reliable and much cheaper than electricity.

At the meeting of the Pontypridd Education Committee last Thursday, it was pointed out that at a school where a centre had been established for teaching girls cooking no proper gas-stove had been fixed for the purpose. A member of the Committee said that grates were common locally, and therefore girls should be taught cookery by their means. The Chairman (Mr. J. Roberts, J.P.) emphasized the advantages of gas-stoves from an economical point of view, and the need of teaching girls how to cook, having regard to the scandalous and appalling waste which could be daily seen in the cottages. It was decided to provide a gas-stove for the school.

An explosion of acetylene gas occurred an Friday night at the Exeter Manual School. The premises are of a temporary character, pending the erection by the City Council of a large building in connection with the Royal Albert Memorial College. It appears that Mr. Toms, the Chief Instructor, was concluding a demonstration in the school; and Mr. M'Quade, the Assistant-Instructor, went into the courtyard below to charge the acetylene generator in preparation for the next course. He had almost completed his task when the vessel exploded. He was knocked down and stunned, and sustained injuries which necessitated his removal to the hospital, where he was detained. It appears that he was examining the holder with a light, which ignited the escaping gas.

RICHMOND'S

New Gas-Fire

List.

SPECIALLY DESIGNED

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Chas. E. Dawson.

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Works: WARRINGTON and STRATFORD.

BOOKLETS ON APPLICATION FREE.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

ENGINEER AND MANAGER. Padiham Gas Department. Applications by Oct. 31.
DISTRICT INSPECTOR. No. 4276.
TRAVELLER. No. 4275.
CLERK. Redcar Gas-Works.
CLERK. Basingstoke Gas-Works.
CLERK, COLLECTOR, &c. Sleaford Gas-Works.
JUNIOR CLERK. Eaton, Cannon S treet, E.C.

Situations Wanted.

INSPECTOR OF FITTINGS, &c. No. 4277.
SULPHATE MAKER. No. 4378.

Stocks and Shares.

BARNET GAS AND WATER COMPANY. Oct. 25.
COLONIAL GAS ASSOCIATION. Nov. 2.
CROYDON GAS COMPANY. Nov. 1.
CROYDON GAS COMPANY. Nov. 2.
GRAYS GAS COMPANY, Nov. 7.
LOWESTOFT WATER AND GAS COMPANY. Oct. 25.
MAIDSTONE GAS COMPANY. Nov. 2.
SOUTH AFRICAN LIGHTING ASSOCIATION. Nov. 2.
SOUTH ESSEX WATER COMPANY. Oct. 25.
SOUTH WEST SUBURBAN WATER COMPANY. Nov. 7.
SOUTHEND GAS COMPANY. Nov. 2.
STIRLING GASLIGHT COMPANY. Nov. 8.
SUNDERLAND AND SOUTH SHIELDS WATER COMPANY. Nov. 16.
TOTTENHAM AND EDMONTON GASLIGHT COMPANY Nov. 2.

TENDERS FOR

Boiler, &c.

BROADSTAIRS AND ST. PETER'S WATER DEPARTMENT. Tenders by Oct. 28.

Condenser (Vertical).

DEVONPORT GAS DEPARTMENT. Tenders by Oct. 29.

Fire Clay Goods.

SHEFFIELD GAS COMPANY. Tenders by Nov. 7.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 163.

Issue.	Share.	When ex-Dividend	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Oct. 13	10½	Alliance & Dublin 10 p.c.	19½—20*	..	5 5 0
100,000	10	,,	7½	Do. 7 p.c.	13—14*	..	5 7 2
200,000	5	May 12	6¼	Bombay, Ltd.. . .	6¼—6⅝	..	4 16 4
140,000	5	,,	6⅜	Do. New, £4 paid	4⅜—5⅛	..	4 18 11
50,000	10	Aug. 31	14	Bourne-) 10 p.c. .	29—30	..	4 13 4
251,810	10	,,	7	mouth Gas) B 7 p.c. .	14½—15½	..	4 10 4
53,200	10	,,	6	and Water) Pref. 6 p.c.	14—15	..	4 0 0
380,000	Stk.	Aug. 12	12	Brentford Consolidated	235-240	..	5 0 0
300,000	,,	,,	9	Do. New . . .	178—183	..	4 18 4
50,000	,,	,,	5	Do. 5 p.c. Pref. .	125—130	..	3 16 11
206,250	,,	June 10	4	Do. 4 p.c. Deb. .	102—105	..	3 16 2
220,000	Stk.	Sept. 15	11	Brighton & Hove Orig.	207—212	..	5 3 9
246,320	,,	,,	8	Do. A. Ord. Stk. .	148—153	..	5 4 7
460,000	20	Sept. 29	10	British	38½—39¾	..	5 1 3
100,000	Stk.	Aug. 12	6	Bromley, Ord. 5 p.c. .	114—118	..	5 1 9
165,700	,,	,,	4½	Do. do. 3¼ p.c. .	88—93	..	4 16 9
500,000	10	Oct. 13	7	Buenos Ayres (New) Ltd.	11½—11¾*	..	5 19 2
250,000	Stk.	June 29	4	Do. 4 p.c. Deb. .	92—94	..	4 5 1
150,000	20	July 14	8½	Cagliari, Ltd.	22—24	..	6 17 6
100,000	10	Sept. 29	10	Cape Town & Dis , Ltd.	13⅞—14½	..	6 17 11
101,000	10	Apl. 28	4½	Do. 4½ p c Pref . .	9¼—9⅝	..	4 12 4
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	51—53	..	5 13 2
50,000	Stk.	June 29	4½	Do. 4½ p.c. Deb. Stk	98—100	..	4 10 0
1,375,000	Stk	Aug. 31	5⅜	Commercial 4 p.c Stk. .	108—112	..	4 12 10
560,000	,,	,,	5	Do. 3½ p.c. do. .	104—107	..	4 13 6
450,000	,,	June 10	3	Do. 3 p.c. Deb. Stk.	84—86	+½	3 9 9
800,000	Stk.	June 10	6	Continental Union, Ltd.	102—107	..	5 12 2
200,000	,,	,,	7	Do. 7 p c. Pref.	135—140	..	5 0 0
486,090	10	July 14	11	European, Ltd. . . .	19½—20¾	..	5 7 4
354,060	10	,,	11	Do. £7 10s. paid	14—15	..	5 10 0
15,243,200	Stk.	Aug. 12	4⅛	Gas-) 4 p.c. Ord. . .	95—97	+1	4 10 9
2,600,000	,,	,,	3⅜	light) 3½ p.c. max. .	88—90	+1	3 17 9
3,799,735	,,	,,	4	and) 4 p.c. Con. Pref.	107—110	..	3 12 9
4,193,975	,,	June 29	3	Coke) 3 p.c. Con. Deb.	87—89	..	3 7 5
258,740	Stk.	Sept. 15	5	Hastings & St. L. 3½ p.c.	90—95	..	5 5 3
70,000	10	Sept. 29	11	Hongkong & China, Ltd.	15—16	..	6 17 6
3,800,000	Stk,	May 12	10	Imperial Continental .	207—212	+4	4 14 4
473,600	Stk.	Aug. 12	3½	Do. 3½ p.c. Deb. Red.	95—98	..	3 11 4
175,036	Stk.	Aug. 31	6	Lea Bridge Ord. 5 p.c. .	115—120	..	5 0 0
561,000	Stk.	Aug. 31	10	Liverpool United A . .	218—220	..	4 10 11
718,100	,,	,,	7	Do. do. B .	158—160	..	4 7 6
306,083	,,	June 29	4	Do. do. Deb. Stk.	106—108	..	3 14 1

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d
75,000	5	June 29	5	Malta & Medn., Ltd. .	4¼—4⅜	..	5 5 3
560,000	100	Oct. 1	5	Met. of) 5 p.c. Deb. .	101—103	..	4 17 1
250,000	100	,,	4½	Melbourne) 4½ p.c. Deb.	100—102	+2	4 8 3
541,920	20	May 27	2½	Monte Video, Ltd. . .	10⅜—11⅛	..	6 1 9
1,515,892	Stk.	July 29	4½	Newc'tle & G'tesh'd Con.	106—106½	+1½	4 4 6
406,125	Stk	July 1	3½	Do. 3½ p.c. Deb.	92—92½	..	3 15 8
15,000	10	Aug. 31	10	North Middlesex 10 p.c.	19—20	..	5 0 0
52,940	1	,,	7	Do. 7 p c.	13—14	..	5 0 0
300,000	Stk.	May 12	8	Oriental, Ltd. . . .	142—147	..	5 8 10
600,000	5	Sept. 15	7	Ottoman, Ltd. . . .	5½—6½	..	5 12 0
235,005	Stk.	—	6⅝	Plym'th & St'house 5 p.c.	—	..	—
308,490	5	Apl. 28	5	Primitiva Ord. . . .	5⅛—5⅜	..	4 6 11
796,980	5	July 28	5	Do. 5 p.c. Pref. .	4⅞—4⅝	..	5 5 3
488,900	100	June 1	4	Do. 4 p.c. Deb. .	93—95	..	4 4 3
851,070	10	Oct. 13	7	River Plate Ord. . . .	11⅛—11¾*	..	5 19 2
300,000	Stk.	June 29	4	Do. 4 p.c. Deb. .	93—95	..	4 4 3
250,000	10	Sept. 15	6	San Paulo, Ltd. . . .	11⅛—12⅛	+⅛	4 16 0
70,000	50	June 29	5	Do. 5 p.c. Deb. .	49—51	..	4 18 0
135,000	Stk.	Mar. 10	10	Sheffield A	237—239	..	4 3 8
209,984	,,	,,	10	Do. B	236—238	..	4 4 0
523,498	,,	,,	10	Do. C	234—236	..	4 4 9
123,998	Stk.	Sept 29	5	Shrews'bury Ord. 5 p.c.	104½—107½	..	4 13 0
70,000	10	,,	11	South African	15—16	..	6 17 6
6,250,000	Stk,	Aug. 12	5⅛	South Met., 4 p.c. Ord.	125—127	..	4 6 8
1,832,700	,,	July 14	3	Do. 3 p.c. Deb.	87—89	..	3 7 5
575,000	Stk.	Aug. 31	5⅛	S'th Suburb'n Ord. 5 p.c	117—122	..	4 10 2
60,000	,,	,,	5	Do. 5 p.c. Pref. . .	120— 25	..	4 0 0
112,533	,,	July '4	5	Do. 5 p c. Deb. Stk.	133—138	..	3 12 6
380,940	Stk.	May 12	5	Southampton Ord. . .	105—110	..	4 10 11
87,950	,,	—	4	Do. 4 p.c. Deb.	—	..	—
120,000	Stk.	Aug. 31	6¼	Tottenham) A 5 p c. .	120—'25	..	5 0 0
325,520	,,	,,	4⅜	and) B 3½ p.c. .	95—100	..	4 15 0
115,000	,,	June 29	4	Edmonton) 4 p.c. Deb.	101—107	..	3 14 9
182,380	10	June 10	8	Tuscan, Ltd.	8¼—8⅜	..	9 2 10
149,900	10	July 1	5	Do. 5 p c. Deb. Red.	96— 8	..	5 2 0
30,000	Stk.	Aug. 31	7½	Wands-) A 5 p c. . .	150—155	..	5 0 0
255,636	,,	,,	6¼	worth) B 3½ p.c. . .	120—125	..	5 0 0
50,000	,,	,,	5⅛⅛	and) C 3½ p.c. . .	102—107	..	4 18 2
59,416	,,	June 29	3	Putney) 3 p c Deb. Stk.	78—83	..	5 12 8
745,872	,,	Aug. 12	5	West Ham 5 p.c. Ord.	97—99	+½	5 1 0
85,000	,,	,,	5	Do. 5 p.c. Pref. . .	115—120	..	4 3 4
160,000	,,	June 29	4	Do. 4 p.c. Deb. Stk.	103—108	..	3 14 1

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URBAN DISTRICT COUNCIL OF PADIHAM.

APPOINTMENT OF GAS ENGINEER AND MANAGER.

THE Urban District Council of Padiham invite APPLICATIONS for the post of GAS ENGINEER and MANAGER, at a Salary of £130 per annum, increasing after Two Years to £156* if his services are satisfactory.

The person appointed will have charge of the Council's Gas-Works, and will be required to perform all the duties usually performed by a Gas Engineer and Manager.

The person appointed must devote his whole Time to the duties of his Office.

Applications, stating Age, Experience, and Qualifications, and accompanied by *copies* of not more than Three recent Testimonials, to be sent to me on or before the 31st day of October, 1904, marked "Gas Engineer and Manager."

Canvassing Councillors, either directly or indirectly, will be a disqualification.

JAS. C. WADDINGTON,
Clerk to the Council.

Council Offices, Mill Street,
Padiham, Sept. 28, 1904.

* This amount was inadvertently printed as £136 in our issue for Oct. 4.

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Specifications and Forms of Tender may be obtained on application to the Company's Engineer, Mr. J. W Morrison.

The Directors do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, Marked "Tender for Fire-Clay Goods," must be delivered by post to the undersigned not later than the first post of Monday, Nov. 7.

HANBURY THOMAS,
General Manager and Secretary.

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Sheffield, Oct. 11, 1904.

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Sealed Tenders, on the Form provided for the purpose, must be delivered at the Office of the undersigned, endorsed "Tender for New Boiler," not later than Friday, the 28th of October, 1904.

The Council do not bind themselves to accept the lowest or any Tender.

L. A. SKINNER,
Clerk of the Council.

Council Offices, Broadstairs,
Oct. 12, 1904.

BOROUGH OF DEVONPORT.

THE Gas Committee are prepared to receive TENDERS for a VERTICAL CONDENSER suitable to Cool the Waste Gases from a 2-Ton Continuous Sulphate Plant, with 6-inch Inlet and Outlet Pipes.

The Condenser is to be delivered at the Gas-Works, Devonport, together with Working Drawing to facilitate erection; and it will be erected by the Corporation.

Tenders, accompanied with blue print of the proposed Apparatus, to be sent to R. J. Fittall, Esq., Town Clerk, Devon ort, on or before the 29th day of October, 1904.

By order,
SIDNEY E. STEVENSON,
Engineer and Manager.

Gas-Works, Devonport.

STIRLING GASLIGHT COMPANY.
(INCORPORATED BY ACT OF PARLIAMENT).

SALE OF £10,000 NEW ORDINARY SHARE CAPITAL.

NOTICE is Hereby Given, that as authorized by the resolution of an Extraordinary Meeting of Shareholders held at Stirling, on Friday, the 23rd of September ultimo, it is the intention of the Directors of the Company to SELL BY TENDER, to be received at the Secretary's Office, Wolf Craig, Stirling, not later than Two p.m. on the 8th day of November, 1904,

TEN THOUSAND POUNDS OF NEW FIVE PER CENT. ORDINARY SHARES OF THE COMPANY.

The Shares now for Sale are the first issue of Additional Capital under, and subject to, the provisions of the Stirling Gas Order, 1904 (confirmed by the Gas Orders Confirmation No. 3 Act, 1904). The Standard Rate of Dividend is Five per cent., subject to the Sliding-Scale Clauses, under which the authorized rate of dividend (so long as the price of Gas continues at 2s. 10d. per 1000 cubic feet) is

£5 10s. PER CENT. PER ANNUM.

The Dividend may be increased by Two Shillings and Sixpence per cent. for every additional Penny taken off the price of 1000 cubic feet of Gas.

The Shares will be of the value of £10 each, and a deposit of £2 10s. per Share on the nominal amount applied for must accompany each Tender, with the full amount of premium offered. £2 10s. per Share will be payable on allotment, and the balance of £5 on or before the 16th day of December next.

MINIMUM PRICE PER SHARE £10 10s.

The Company for the past Two Years, 1903-04, paid the full statutory dividend authorized under the Sliding-Scale provisions of the Incorporating Act of 1898.

The amount of undivided profits at May 15, 1904 (after providing for all known liabilities, paying £3520 6s. 7d., as full dividend on the original capital, and placing an additional sum of £500 to the credit of the Insurance Fund) carried forward to the credit of this year's account, was £2547 0s. 1d. Since 1898, the Company has paid £5000 out of revenue on capital expenditure, and in addition has expended nearly £20,000 on extensions of plant and other capital charges, including a new gasholder, &c., &c. The works are now in the most modern and efficient condition. New Purifiers have recently been erected, and Sulphate of Ammonia Plant is been introduced, which will effect considerable economy in the Manufacture and disposal of Bye-Products of Gas. The sale of gas has increased from 58,530,000 cubic feet in 1898 to 89,240,000 cubic feet for the year ended the 15th of May last. Since that date, a satisfactory rate of progress has continued.

Full Particulars, Forms of Application, and Conditions of Tender, may be obtained at the Office of Mr. David Chrystal, Solicitor, 64, Murray Place, Stirling, or at the Office of the Secretary.

By order of the Board,
EBEN. GENTLEMAN,
Secretary.

2, Wolf Craig, Stirling,
Oct. 1, 1904.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
BARNET DISTRICT GAS AND WATER COMPANY.

NEW ISSUE OF £6000 "D" CAPITAL GAS STOCK

Ranking for a Maximum Dividend of 7 per cent, previous Issues of Similar Stock now receiving £5 5s. per cent.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Oct. 25, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
LOWESTOFT WATER AND GAS COMPANY.

NEW ISSUE OF 400 ADDITIONAL ORDINARY £10 SHARES,

Ranking for a Maximum Dividend of 7 per cent., the previous issues of similar Shares now receiving 5½ per cent.; also

£1000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Oct. 25. at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTH ESSEX WATER-WORKS COMPANY.

NEW ISSUE OF £5000 ORDINARY STOCK,

Ranking for a Maximum Dividend of 5 per cent., previous Issues of similar Stock now receiving 4 per cent., free of Income Tax.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION at the Mart, E.C., on Tuesday, Oct. 25, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By Order of Executors.
GAS STOCKS AND SHARES
IN THE
TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.
CROYDON GAS COMPANY.
MAIDSTONE GAS COMPANY.
SOUTH AFRICAN LIGHTING ASSOCIATION, LTD.
COLONIAL GAS ASSOCIATION, LIMITED.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, Nov. 2, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By Order of the Directors of the
SOUTHEND GAS COMPANY.

NEW ISSUE OF £20,000 NEW ORDINARY "B" STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, Nov. 2, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
GRAYS GAS COMPANY, LIMITED.

NEW ISSUE OF 300 £10 "B" SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Monday, Nov. 7, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By Order of the Directors of the
SOUTH-WEST SUBURBAN WATER COMPANY.

NEW ISSUE OF 2100 £10 FIVE PER CENT. PREFERENCE SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C, on Monday, Nov. 7, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

To Trustees and Others.—By order of the Directors of
THE CROYDON GAS COMPANY.

SALE OF £2500 FIVE PER CENT. AND £5000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

HOOKER and WEBB have received instructions to SELL BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Tuesday, 1st November, 1904, at Two o'clock precisely, in 82 Lots,

£2500 FIVE PER CENT., and £5000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK of the Croydon Gas Company. The Reserve and Insurance Funds at Midsummer last amounted to £44,522 8s. 11d. The paid-up Ordinary Capital at that date was £310,000, whereas the Debenture Stock then issued amounted to £37,500, thus showing that the stock now offered is a security of the highest class.

Particulars and Conditions of Sale may be had of the Secretary, at the Offices of the Company, Katharine Street, Croydon; at the Mart, E.C.; and of Messrs. HOOKER & WEBB, Auctioneers and Surveyors, 4, High Street, CROYDON.

SUNDERLAND AND SOUTH SHIELDS WATER COMPANY.

IMPORTANT SALE OF WATER STOCK.

TO BE SOLD by Auction, in the Long Room of the Queen's Hotel, Fawcett Street, Sunderland, on Wednesday, the 16th of November, 1904, at Three o'clock in the afternoon prompt,

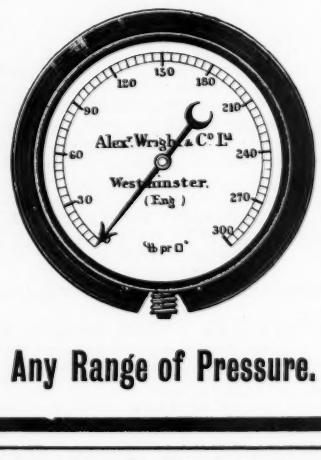
Mr. ATKINSON GIBSON, AUCTIONEER,

£20,000 (Nominal) of ADDITIONAL ORDINARY CAPITAL STOCK (maximum Dividend 5 per Cent.) authorized to be created and issued under the powers contained in the Sunderland and South Shields Water Act, 1891.

The above Stock will be entitled to Dividend from the 1st day of January, 1905, and be registered in the name of the Purchaser free of charge.

A Deposit of 10 per cent. will be required at the time of Sale; the remainder to be paid on or before the 20th day of December, 1904.

STEAM, OIL, and WATER.



Any Range of Pressure.

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MIRFIELD GAS COAL
UNEQUALLED.
Sperm Value 878·85 lbs. per Ton.

Prices and Analysis on application.

The MIRFIELD (GAS-COAL) COLLIERIES CO., RAVENSTHORPE, NEAR DEWSBURY.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

Just Published. Crown 8vo, 6s. Cloth.

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CONSTRUCTION AND ARRANGEMENT

And the Manufacture and Distribution of Coal Gas.

By S. HUGHES, C.E.

Ninth Edition, Revised, with Notices of Recent Improvements.

By HENRY O'CONNOR, A.M.Inst.C.E.,

Author of the "Gas Engineer's Pocket Book."

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7, STATIONERS' HALL COURT, E.C.

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IMPERIAL

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WRITE FOR LISTS.

Season 1904-5.

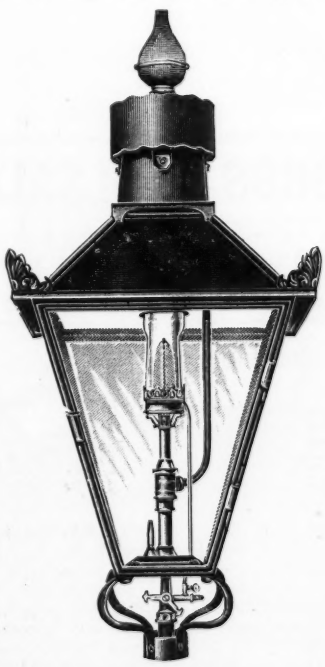
Telephone ONE X, LEAMINGTON.

PATENT RECUPERATIVE

INCANDESCENT GAS LAMP.

The only Lamp with absolutely **DUST AND INSECT PROOF BURNER.**

MANY DETAIL IMPROVEMENTS.



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Telephone 6600 Central. Telegrams: "PROMEROPE."

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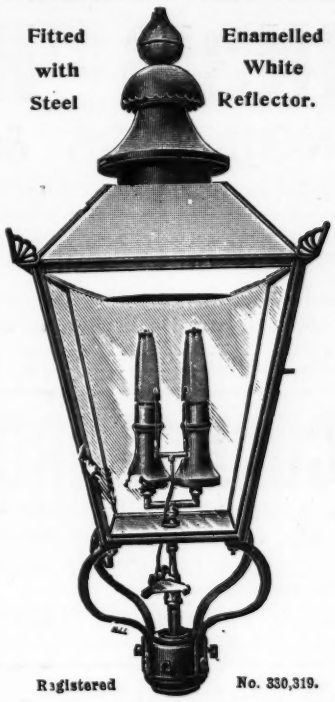
Fitted with Steel

Enamelled White Reflector.



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SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES,

SPANNERS, RATCHET BRACES, LIFTING JACKS,

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MANUFACTURE

SILICA BLOCKS, BRICKS, AND CEMENT

OF SUPERIOR QUALITY

FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.

For Particulars, Price, &c., apply to Mr. EDWARD PRICE, "Langley," Wyke Avenue, WORTHING.

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Efficiency Demonstrated.

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New and Second-Hand with all Accessories; also Tip Waggons and Turntables.

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MIDLAND WORKS,

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The "BRITON" and "RENNIE" Gas Arc Lamps

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VERY STRONG ORNAMENTAL LAMPS.

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"V" PATTERN "BRITON" LAMP.

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FOR GAS ENGINEERS & MANAGERS

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The Work has been revised throughout, and contains 40 pages of Letterpress and 12 Illustrations more than the last Edition.

In almost every department additions have been made; and it is believed that the labour bestowed on its production will enhance the value of the book as a Work of Reference.

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Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

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And Fittings & Accessories.

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BRASS GAS-FITTINGS. GAS-VALVES STEAM & WATER VALVES TOOLS. &c. AND OF
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LONDON: LAMBETH BRASS & IRON CO., LTD., 91 & 93, SOUTHWARK ST., S.E.

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Gasholders & Gas Plant

OF EVERY DESCRIPTION.

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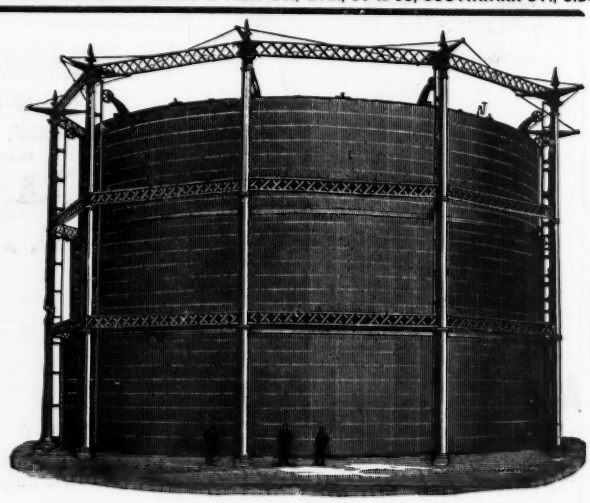

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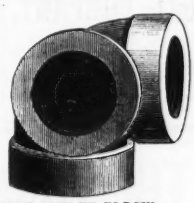
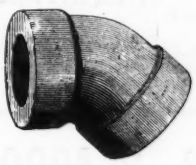
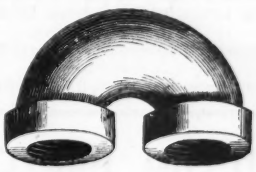


SIDE OUTLET ELBOW.



45° ELBOW.



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Malleable, and Soft Cast-Iron Tube Fittings for Gas and Water. Largest Stock in Great Britain.

Discounts on the basis of 80 % and 20 % for Malleable Elbows and Tees, and 62½ % and 25 % for Cast-Iron Fitting off the Standard List.

Every Fitting Guaranteed. Write for full List and Discounts.

NEW COMPARTMENT GAS COOKING, HEATING, AND BAKING APPARATUS.

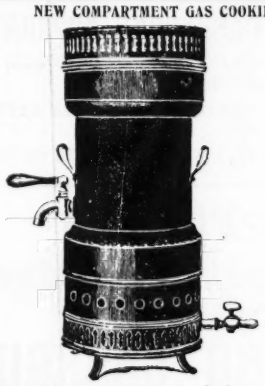


Fig. 1.—The Compartment Gas-Cooker.

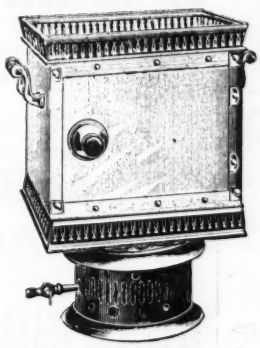


Fig. 2.—Showing Baking Oven.

The Compartment Gas Cooker, FIG. 1, will fry or stew chops or steaks, boil two vegetables, or six eggs, and make tea or coffee at the same time. **PRICE, 6/3 each nett.**

Heating drum, to fit on stove, is instantly interchangeable with the cooking apparatus, and will heat a room for 7 hours at a cost of 1d. **PRICE, 1/3 nett.**

Baking oven, also interchangeable with cooking apparatus on stove, FIG. 2. **PRICE, 3/9 nett.**

GAS-FITTERS' PIPE BENDING SPRINGS.

1 in. . .	1/- ea. Nett.	2½ in. .	4/10 ea. Nett.
1¼ in. . .	1/5 ,, ,,	3 in. .	6/3 ,, ,,
1½ in. . .	1/11 ,, ,,	3½ in. .	8/6 ,, ,,
2 in. . .	2/6 ,, ,,	4 in. .	10/9 ,, ,,

OPEN HINGE PIPE-VICES.

Malleable Iron. Tool Steel Jaws.

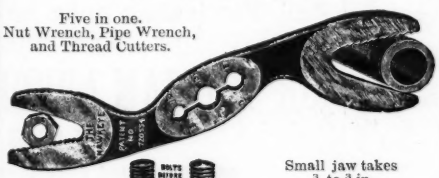
	No. 1.	No. 2.
Takes Pipe	⅛ in. to 2 in.	⅛ in. to 3 in.
Weight .	20lbs.	26lbs.
PRICE, .	7/6 each.	12/- each.

THE "NEW ERA" GAS HEATER AND HOT-AIR RADIATOR.

Refined Dead Black Russian Iron, with Aluminium Bronzed Base & Dome. **PRICE, 10/6 ea.**

THE "HAWKEYE" WRENCH.

Five in one.
Nut Wrench, Pipe Wrench, and Thread Cutters.



Has more uses than any other wrench made.

Small jaw takes ⅛ to ¾ in.
Large jaw takes ½ in. to 1⅛ in.
Dies ⅝, ⅞ in., and ½ in.

PRICE, 30/- per doz.

PIPE STOCKS AND DIES.

No. 1, with 5 dies and bushings, ¼ to 1 in. . . .	Price 13/6
No. 1½, with 3 dies and bushings, ¾ to 1½ in. . . .	,, 12/3
No. 2, with 3 dies, bushing, and leader screw, 1¼ to 2 in.	,, 18/3

TUBE CUTTERS.

One wheel, three wheel, or one wheel and two rollers.

	No. 1.	No. 2.
Capacity . .	⅛ in. to 1 in.	1 in. to 2 in.
PRICE, one wheel, each	3/4	5/3
Three ,, ,,	4/3	5/9
Roller, each	3/10	5/6

GAS-FITTERS' FURNACE.

The "Coil"

PRICE, 10/6 each.

TINNED STEEL PIPE CLIPS.

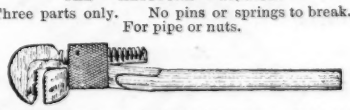
Made in all Lead and Iron Pipe sizes.

THE "EXHIBIT" Ltr. S. SOLDERING LAMP.

Most Powerful on the Market.
PRICE 6/9 Nett.

THE "KEYSTONE" WRENCH.

Three parts only. No pins or springs to break.
For pipe or nuts.



Length open in.	10	14	18	24
Takes from	⅛ in. Wire to 1 in. pipe	⅛ in. Wire to 1½ in. pipe	⅛ in. Wire to 2 in. pipe	⅛ in. Wire to 2 in. pipe
PRICE	3/10	5/-	6/6	10/-

SPECIAL TERMS for PIPE CLIPS.

3½d. per lb.

Carriage paid on £5 nett. If counted out in grosses, 2d. per gross nett extra. 5 per cent. 5 days, 2½ per cent. 30 days.

THE "WARNOCK" PIPE WRENCH.

Takes all Sizes, leaves no marks.

Will not mark or crush the most highly Polished Pipe.
PRICE, 12 inches, **5/- each.**
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ALL GOODS SOLD *ex* **WAREHOUSE LIVERPOOL OR LONDON.** *Terms nett cash 10 days.*

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Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
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LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

HEATHCOTE GAS COAL.
Rich in Illuminating Power and yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.
THE GRASSMOOR CO., Ld.,
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WILSON CARTER & PEARSON LIMITED,
GAS COAL AND CANNEL FACTORS,
Supply to any Railway Station, or for Export, all kinds of Fuel for Gas and Other Purposes.
ADDRESS CHIEF OFFICES:
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THE LEEDS FIRECLAY CO., LTD.
JOSEPH CLIFF & SONS' BRANCH.
Cliff's Wortley Silica Bricks.
FOR Arches and Crowns where high heats are required. They contain over 90 per cent. of Silica, and are nearly stationary under the influence of heat, swelling a little rather than contracting. They are not like a Gannister or Dinas Brick, but a Fire-Brick of a highly Silicious nature.
Cliff's Wortley Aluminous Bricks.
THESE are for Side Walls where great wear and tear takes place. Are made of a specially prepared mixture, are high in Alumina, and are what is termed a Hard Fire-Brick.
Baltic Wharf, Waterloo Bridge, London, S.E.
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Carborundum Bricks, Carborundum Crucibles, &c.
DR. ENGELS' PATENT
CARBORUNDUM COATINGS
For Lining **GAS-GENERATORS.**
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THE THAMES BANK IRON CO.
UPPER GROUND STREET, LONDON, S.E.
SUPPLY FROM STOCK
CAST-IRON RETORTS
AND ALL KINDS OF GAS-WORKS APPARATUS.
SOCKET-PIPES FOR GAS OR WATER PURPOSES.
FLANGE PIPES FOR STEAM.
Sole Manufacturers of **LYON'S "PATENT" GAS-MAIN SYPHONS.**
Agents for
ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.

ARROL-FOULIS
Patent Automatic Machinery
FOR
DRAWING AND CHARGING GAS-RETORTS.
Full Particulars may be obtained from the Sole Makers.
SIR WILLIAM ARROL & CO., Limited,
GLASGOW.
[See Illustrated Advertisement, Oct. 4, p. 70.]

BEST & LLOYD
MAKERS OF THE **BIRMINGHAM** Limited,
PATENT "SURPRISE" PENDANT,
WITH PATENT SHADE.

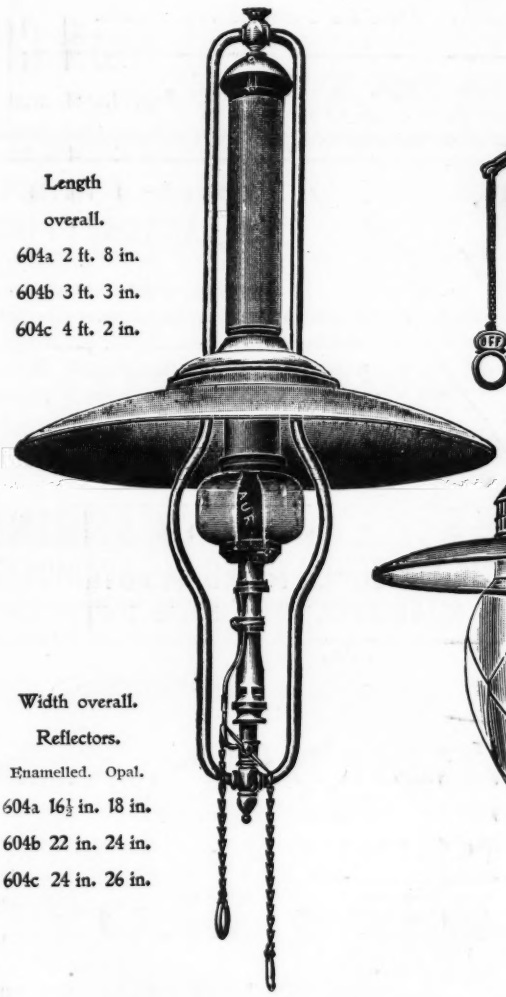
OVER 50,000 NOW IN DAILY USE.
The ONLY GAS-PENDANT suitable for Domestic Lighting; a room 18 ft. by 14 ft. being beautifully illuminated with one Incandescent Burner.
Used in the private apartments of their
Majesties the King and Queen
at Sandringham.

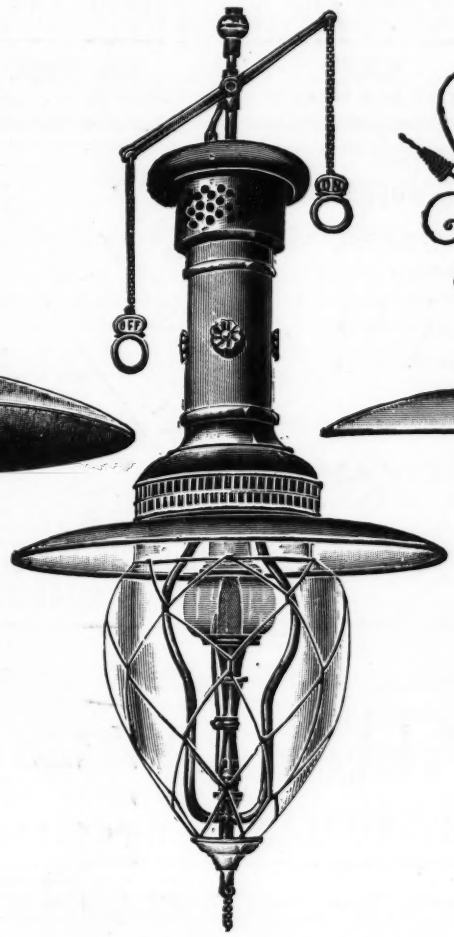
The Welsbach Kern (Patent)

Self-Intensifying Lamps.

Length overall.
604a 2 ft. 8 in.
604b 3 ft. 3 in.
604c 4 ft. 2 in.

Width overall.
Reflectors.
Enamelled. Opal.
604a 16½ in. 18 in.
604b 22 in. 24 in.
604c 24 in. 26 in.





Length overall. Same as sizes 604.

Width overall. Same as sizes 604.

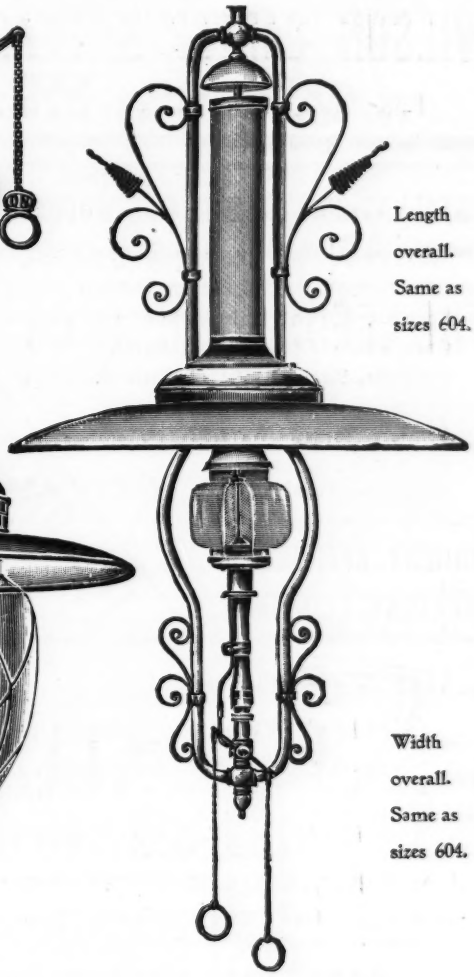


Fig. 604.

Interior Lighting. Enamelled.			
A	5 ft. per hour, 150 c.p.,	£1	13 0
B	10 ft. „ 300 c.p.,	2	8 0
C	20 ft. „ 600 c.p.,	4	4 0

Fig. 607.

Overall.	Length.	Width.	
607b	4 ft. 4 in.	24 in.	
607c	5 ft. 0 in.	29 in.	
Storm Proof Arc. Enamelled Reflector, Cup and Ball Joint, Lever Tap and By-pass.			
607b	10 ft. per hour, 300 c.p.	£5	0 0
607c	20 ft. „ 600 c.p.	7	10 0

Fig. 605.

Interior Lighting (Ornamental).			
605a	5 ft. per hour, 150 c.p.,	£2	5 0
605b	10 ft. „ 300 c.p.,	3	1 6
605c	20 ft. „ 600 c.p.,	5	0 0

SUBJECT TO OUR USUAL TRADE DISCOUNT.

The Welsbach Incandescent Gas Light Co., Ltd.

2 to 14, Palmer Street, Westminster, London, S.W.

Telegrams—"Welsbach," London. Telephone—290 West.

Used by Gas Companies and Corporations everywhere.

"GLASMI"

FIRST

Specially recommended for

STREET LIGHTING.

Made for any Burner on the Market.

THE VERY BEST
GLASMI MANTLES
MADE OF THE FINEST RAMIE THREAD

REGISTERED.

WE MAKE
SLOT FITTINGS, &c.,
A SPECIALITY.

GRADE
THEY HAVE NO EQUAL.

MANTLES.

Send for Samples and Prices.

J. & W. B. SMITH,
19 TO 23, FARRINGDON ROAD, LONDON, E.C.

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HIGHEST EFFICIENCY.
GREATEST ECONOMY.

THE DELLWIK-FLEISCHER WATER GAS PROCESS.
PATENTS IN ALL COUNTRIES.
BLUE WATER GAS, CARBURETTED WATER GAS.

COMBINED WITH
SELF-CARBURETTING
AT

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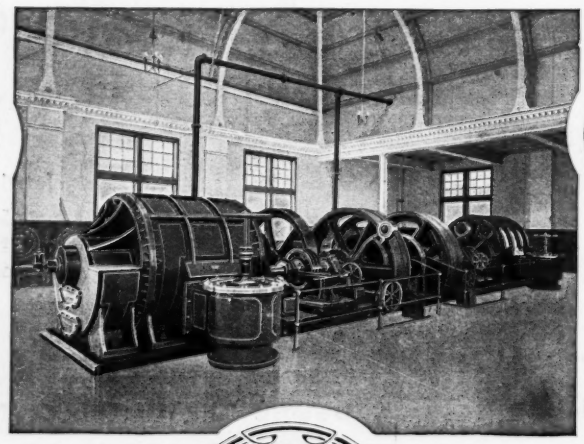
THE
DELLWIK-FLEISCHER WATER GAS SYNDICATE
25, VICTORIA STREET, WESTMINSTER, LONDON, S.W.

R. LAIDLAW & SON,
LIMITED
GAS & WATER ENGINEERS,



SIMON SQUARE WORKS, EDINBURGH.

6 LITTLE BUSH LANE, LONDON, E.C.

TWO EXHAUSTERS EACH TO PASS 750000 CUB. FT. PER HOUR AT 60 REVOLUTIONS PER MINUTE DRIVEN BY TWO GAS ENGINES

AND INTERMEDIATE FRICTIONAL GEARING, ERECTED AT GRANTON GAS WORKS FOR EDINBURGH & LEITH GAS COMMISSIONERS

ALLIANCE FOUNDRY & ENGINEERING WORKS, GLASGOW.

G.I.C.

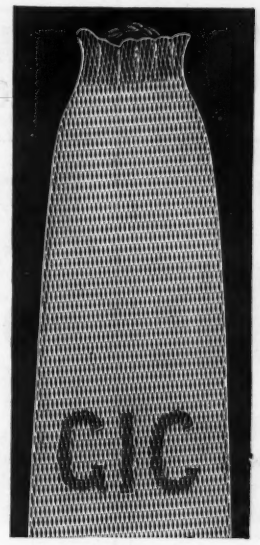
LAMPS, BURNERS, ETC.

G.I.C. Popular High Power Lamp, complete with Improved Silent Burner, price complete, 150 Candles, **16/-**; 250 Candles, **19s.**

G.I.C. High Pressure Burners from **12s.** per doz.

G.I.C. Heavy Steatite Burners, price **5s.** per doz. in gross lots.

For Lowest Prices for everything in connection with Incandescent Lighting see our New Catalogue, just published, which is a complete Buyers' Guide. Post free.



G.I.C.

IMPROVED RAMIE MANTLES.

PRICES. BURNERS.	Per Gross
G.I.C. Pure Ramie Mantle for "C." .	27s.
G.I.C. „ „ „ No. "2" Kern	27s.
G.I.C. „ „ „ No. "3" „	29s.
G.I.C. „ „ „ No. "4" „	30s.
G.I.C. „ „ Long High Pressure	45s.
G.I.C. „ „ Lucas Lamp	7s. per doz.

No Anti-Vibrators are needed where these Mantles are used.

G.I.C. Mantles for Inverted Burners, in finest Double Woven Ramie Thread, best on the market, **45s.** per gross.

SPECIAL QUOTATIONS FOR CONTRACTS, and in 14, 21, and 100 GROSS LOTS.

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Telegrams: "ASABLAZO, LONDON." 56, CITY ROAD, LONDON, E.C. Telephone: No. 9536 London Wall.

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GAS ENGINEERS

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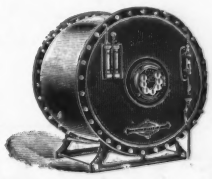
LONDON. —— LEEDS. —— GLASGOW.



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Are being entrusted with **LARGE REPEAT ORDERS** for Home and Abroad for INCLINED and HORIZONTAL RETORTS

CONSEQUENT UPON THE "A1" QUALITY THEY SUPPLY.

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which gives satisfaction Indoor and Outdoor. 700 and 400 c.p.

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80, COMMERCIAL ROAD, LONDON, E.

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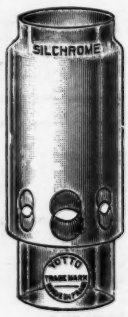

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Clear and Opal.

SUPERIOR to the Best made in Germany.

CHEAPER IN PRICE.

Specially packed to reduce breakage to a minimum.

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ALDWARKE MAIN, CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·20.

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Lamp & Meter Works: HARPUR MEWS, THEOBALD'S RD., LONDON.

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CONTRACTORS FOR
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THE HORIZONTAL OR INCLINED SYSTEMS.

Photograph showing West's Coke-Conveyor dealing with the Coke from Nineteen Through Beds of Retorts.

WEST'S IMPROVED PATENT HOT-COKE CONVEYOR,

With Special Chain constructed with a minimum number of parts, and having Large Joint Pins with ample Bearing Surfaces.

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BELTON'S PATENT AUTOMATIC RELIEF APPARATUS FOR HYDRAULIC MAINS.

Manufacturers for America : Riter-Conley Manufacturing Company, Pittsburg.

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Compressed Air and Gas, Consumption of Gas Reduced to a Minimum.

THE HIGHEST RESULT YET ATTAINED IN GAS LIGHTING.

45 Candles per foot of Gas.

50 PER CENT. SAVING IN GAS CONSUMPTION AS COMPARED WITH THE WELSBACH LIGHT, CANDLE-POWER FOR CANDLE-POWER.

Any Candle Power, from 30-Candles to 2500-Candles, can be obtained with the same amount of economy.

RESULTS GUARANTEED.

TESTIMONIAL. *May 11th*, 1904.

The economy in gas used in the workroom and warehouse, comparing the quarters ending March, 1903, with March, 1904 was as follows:

Gas Account, March, 1903	£12 11 8
,, ,, March, 1904 (Selas)	3 16 3
Saving	£8 15 5

Besides the economy in the gas consumption, the purity and coolness of the atmosphere is even of greater importance. Previously to the installation our people suffered headaches, although the workshops are well ventilated; but under the "Selas" plan, the workpeople have enjoyed better health, and better work is produced. After six months trial of the "Selas" light, we feel sure that its merits will ensure it a permanent success.

We shall be pleased to answer any inquiries, and you are at liberty to publish these results.

(Signed) NICHOLSON & CO., Cloth Proofing Works, St. Albans, Herts.

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Messrs. BEVER & WOLF, 46, VICAR LANE, BRADFORD.

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MAKERS OF EVERY DESCRIPTION OF GAS PLANT.

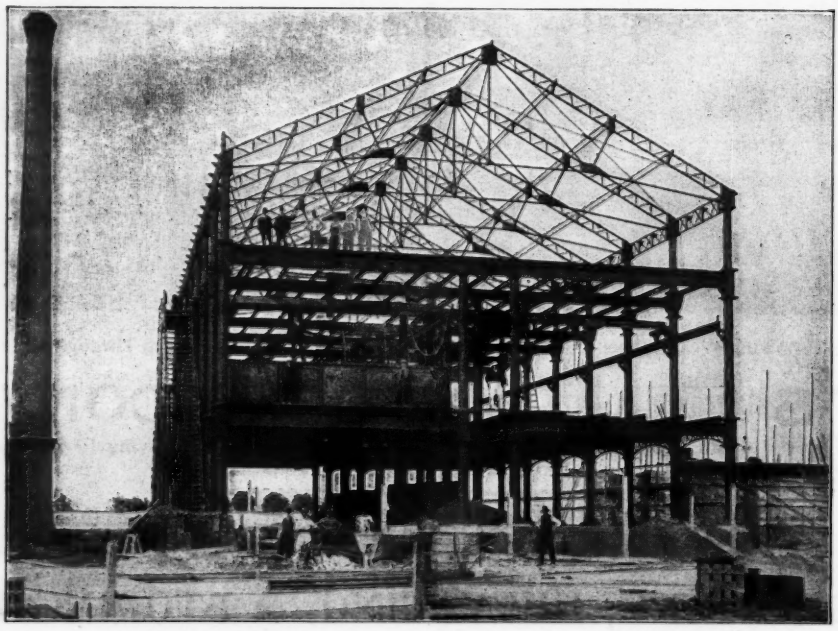

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PHOTO. OF STAGE-FLOOR PURIFIER-HOUSE TAKEN DURING ERECTION FOR THE UNION DES GAZ AT THEIR WORKS NANTERRE, PARIS.

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THE ORIGINAL NEW INVERTED INCANDESCENT GAS-BURNERS

BRITISH MANUFACTURE.

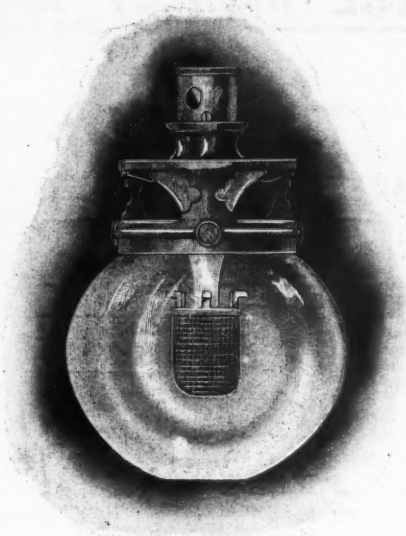
INCREASED DISCOUNTS TO THE TRADE.

New types of BURNERS at popular Prices for the coming Season.

MAXIMUM LIGHT WITH MINIMUM CONSUMPTION OF GAS.

The "Bijou" Burner in clusters for interior lighting has the decorative effect of Electric light at One-Eighth the cost.

NEW LISTS NOW READY.



No. 2 Burner only, in Polished Brass or Steel Bronze, 4s. 6d. Globes from 6d. each. Mantles 7s. per dozen.

No. 3 "Bijou" Burner only, in Polished Brass or Steel Bronze, 3s. Globes from 4d. each. Mantles 6s. 6d. per dozen.

ONLY ADDRESS: THE NEW INVERTED INCANDESCENT GAS LAMP CO., LD., 23, FARRINGDON AVENUE, E.C.

We shall be Exhibiting at the International Gas Exhibition, Earl's Court, W., Nov. 19 to Dec. 17, at STAND No. 60. A visit will be esteemed.

JÄGER'S PATENT GRIDS

APPLICABLE TO EVERY KIND OF PURIFIER.

This System is in successful operation at a very large number of important Gas-Works on the Continent, and orders have been received from English Engineers as follows:—

			ft.		ft.		ft.	in.
CHESTER	1	Purifier	24	×	22	×	5	3
CHESTER 2nd Order	1	,,	24	×	22	×	5	3
ROCHESTER	4	,,	20	×	20	×	5	6
ROCHESTER 2nd Order	2	,,	24	×	20	×	5	0
SOUTHEND	2	,,	20	×	15	×	4	6
HULL	2	,,	20	×	20	×	5	0
BRENTFORD	1	,,	20	×	30	×	7	0
WINCHESTER	4	,,	15	×	15	×	6	0
CAGLIARI	4	,,	10	×	10	×	4	0
HALSTEAD	4	,,	9	×	9	×	5	0
DEAL	1	,,	10	×	10	×	4	6
LEAMINGTON	1	,,	20	×	20	×	5	0
OLDHAM	4	,,	20	×	20	×	4	0

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The well-known
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THE CILCO Mantle.
New Secret Process.

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27/-
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Best Double-Ply Ramie Thread.
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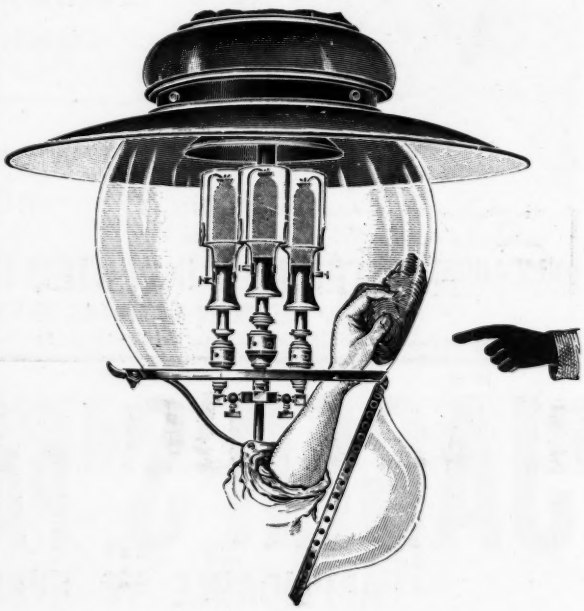
DUDLEY & LONDON

INCANDESCENT LANTERNS

We have effected many improvements in Incandescent Lanterns for the Season. Things have indeed been "made easy."



Part Illustration of Veritas-Celestra Lantern with Special Globe enabling attendant to remove Burners and clean Globe without taking it down.

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WELDLESS STEEL SPIGOT AND FAUCET PIPES
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A PERFECT SUBSTITUTE FOR CAST-IRON MAINS.
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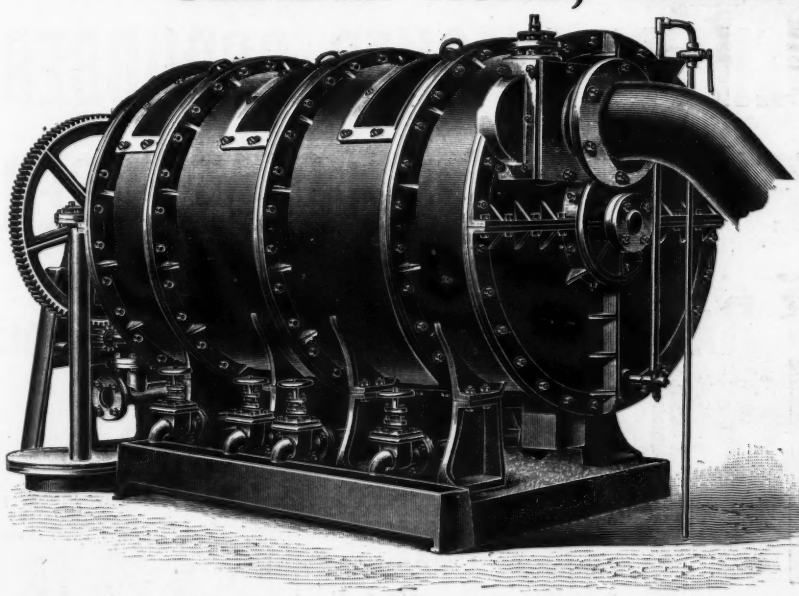
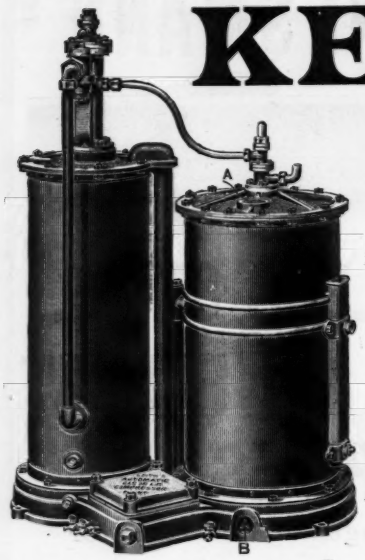


ROTARY
WASHER-SCRUBBERS

Photo. of the 250,000 cubic feet per 24 hours size.

London Office: 165, GRESHAM HOUSE, OLD BROAD STREET, E.C.

THE KEITH LIGHT



No. 3 Compressor, enclosed pattern. Water Driven.

1600 Installations now in use.

Keith's Patent Gas Compressors are perfectly Automatic and require no attention.

Non-fluctuating.

Made in various sizes and arranged to give any constant pressure from 2-inch upwards.

DRIVEN BY ANY AVAILABLE POWER.

No. 3 Compressor. Power Driven.

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CLAPHAM BROS. LTD.,

ESTABLISHED OVER 60 YEARS. SOLE MAKERS OF **KEIGHLEY.**

Laycock & Clapham's Patent **"ECLIPSE" WASHER-SCRUBBER**

Clapham's Patent **"ECLIPSE" WATER-TUBE CONDENSER**

CLAPHAM'S NEW CENTURY COVER WITH PATENT

RAPID AUTOMATIC FASTENERS FOR DRY LUTE PURIFIERS.

Makers of all Ironwork **for Carbonizing Plants, for Inclined or Horizontal Systems, Valves, Mains, Lamp-Columns, Tanks, &c.**

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Printed for WALTER KING, by King, Sell, and Olding, Ltd.; and Published by him at 11, BOLT COURT, FLEET STREET, in the CITY OF LONDON.—Tuesday, Oct. 18, 1904.

Advertisement Supplement to the "Journal of Gas Lighting, Etc."
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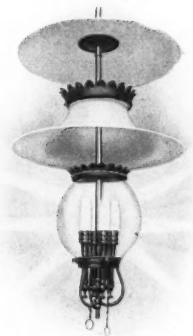
The "Eclipse" Incandescent Gas Arc Lamp.

THE "ECLIPSE" LAMP (INTERIOR).

HIGH POWER, 500 Candle Power.

Very Economical.



LOW PRESSURE, suitable for Stores, Workrooms, Shops, etc., etc.

Price COMPLETE for 4 Burners (except Mantles),

£2 7 3 *(Subject)*

WRITE FOR DISCOUNTS.

WILLIAM EDGAR,

BLENHEIM WORKS,

LOWER MALL, HAMMERSMITH,

LONDON, W.

Advertisement Supplement to the
(October 18th, 1904).

THE "ECLIPSE" INCAND

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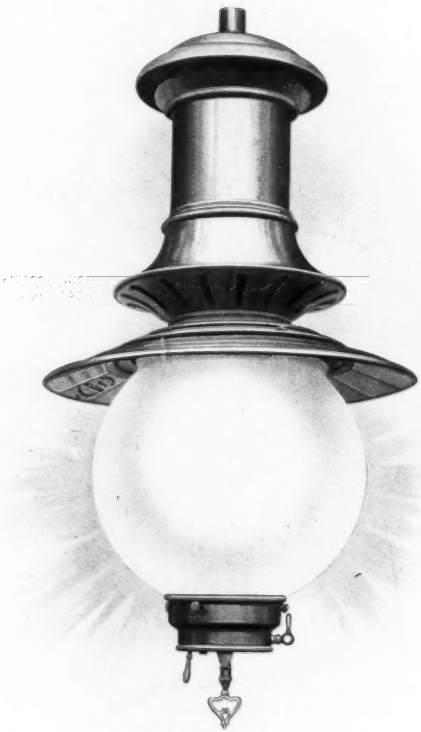
Price Complete, except Mantle

WRITE for DISCOUNTS.



THE ECLIPSE LAMP.

SHOWING GLOBE LOWER

THE SALIENT FEATURES

HIGH POWER (500-C.P). LOW PRESSUR

STRENGTH and DURABILITY.

Manufactured entirely at o

WILLIAM EDGAR, Gas Engineer, Blenheim W

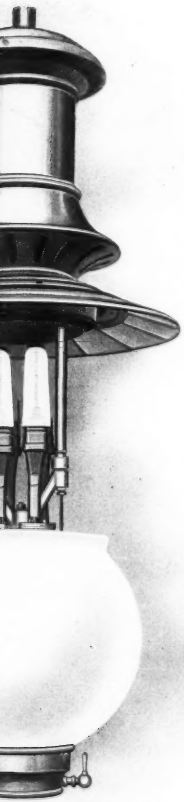
Telephone: No. 14, Hammersmith.

We have in the Press a handsome Brochure, giving full details of

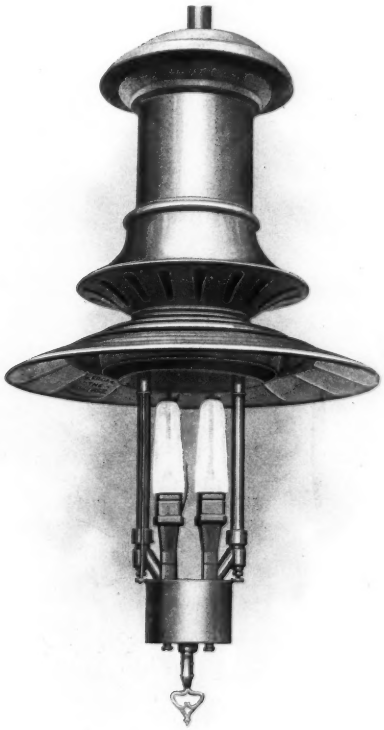
DESCENT GAS ARC LAMP

TDOOR).

les, for Four Burners, **£3 10 0** *(SUBJECT)*



ERED FOR RE-MANTLING.



SHOWING GLOBE DETACHED FOR CLEANING

ES OF THIS LAMP ARE:

URE. WIND PROOF and SHADOWLESS.

PURE WHITE LIGHT.

our Works in London by—

Works, Lower Mall, **Hammersmith, London, W.**

Telegrams: "Gasoso, London."

of this Lamp, which we shall be glad to forward upon application.

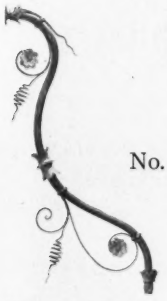
BRACKET ARMS.

¾-IN. BARREL.

No. 1—16/6

No. 2—10/9

No. 3—13/-



No. 4—19/9

No. 5—19/9

WRITE FOR DISCOUNTS.